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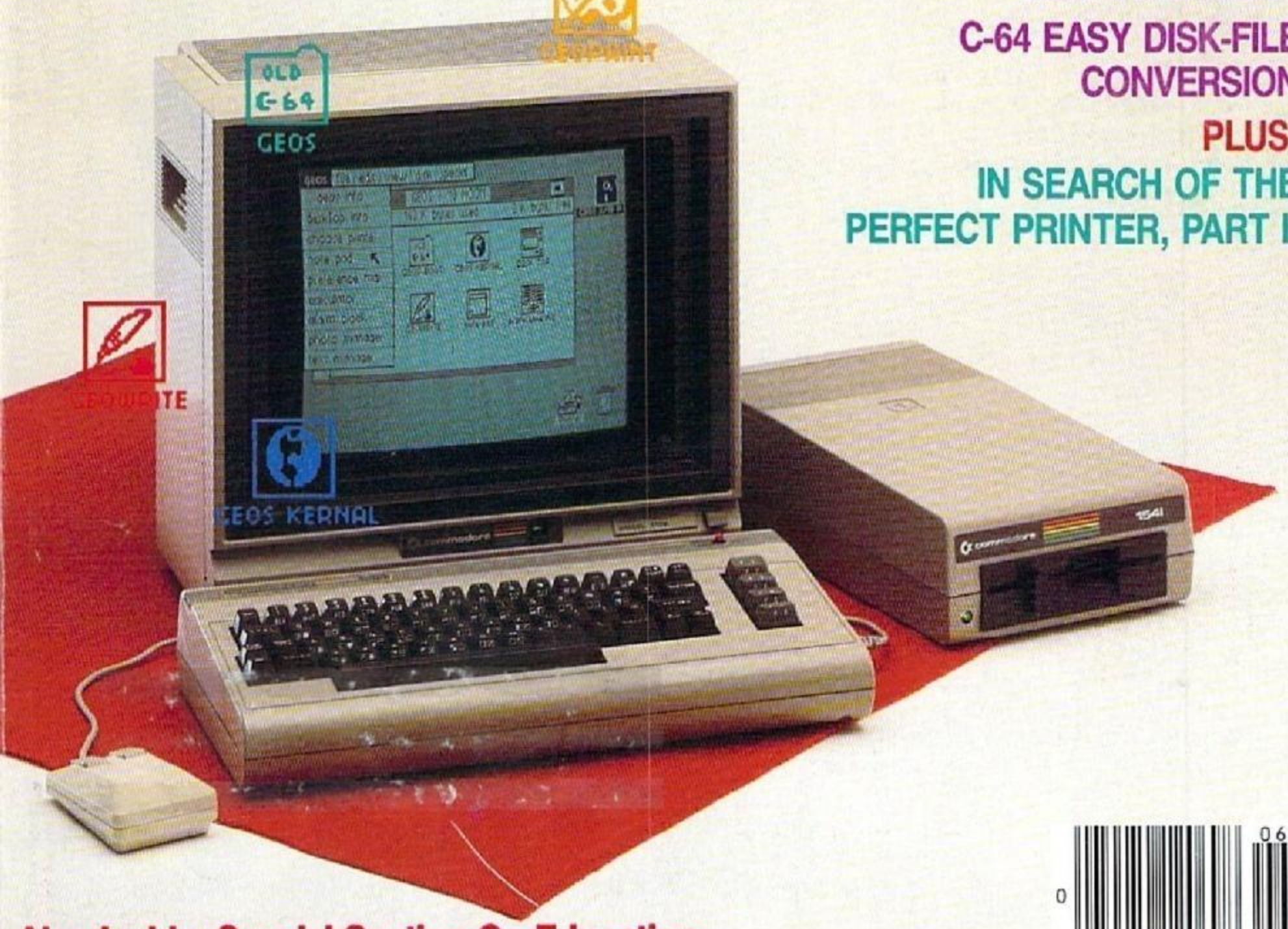

Also Inside: Special Section On Education

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If you own a C-64, you

The one you purchased. And the

GEOS realizes the technical potential that has been in the C-64 all along. Speed. Power. Ease of use. Sophistication. Elegant, practical applications you might expect of a high-end personal computer, all made possible with GEOS. It's so simple—but then, so was fire. Once it caught on.

To begin at the beginning. **GEOS** stands for **GRAPHIC ENVIRONMENT OPERATING SYSTEM.** Why?

GRAPHIC: Because menus and icons replace long, typed command lines. Point and click, that's it.

ENVIRONMENT: Because GEOS provides a consistent, powerful way to use your computer. Learning new applications is a snap (or should we say click).

OPERATING SYSTEM: Because GEOS orchestrates every function so that they all work together systematically, even symphonically.

Some basics. Icons are graphic images which represent files or utilities. Each is different, and all are easy to recognize and easy to use.

A menu is just that: a list of functions available for selection. When a menu appears, move the pointer to any item you wish. Click. Click. You're on your way.

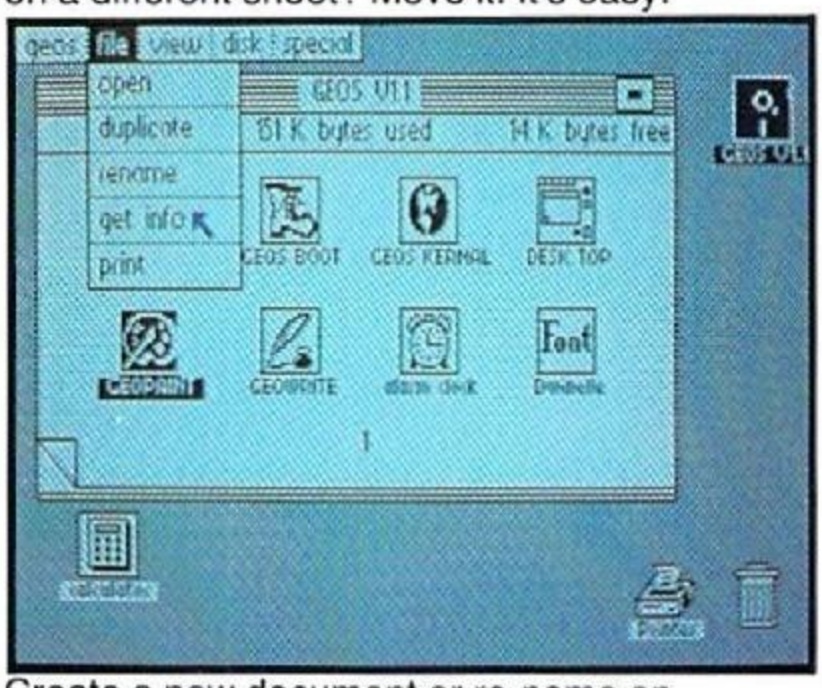
A pointer is used to select and activate items. To move the pointer, roll the mouse or trackball or rotate the joystick. Once on target, click once to select; click a second time to activate.

Fonts are a new way of looking at text. Choose from 5 different fonts (with more on the way). Try Dwinelle, or Roma, **bold,** or *italics,* even underline and outline. Need to fit more words on a line? Pick a smaller point size, like University 6 point, and get over one hundred characters per line.

All this and fast too. Because the integrated diskTurbo software improves 1541 disk drive performance 5 to 7 times. That's right. On both reads and writes.

GEOS can be divided into 4 areas: two functional aspects (deskTop and Desk Accessories), and two major applications (geoPaint and geoWrite).

deskTop. deskTop is a graphic interface, making file organization and management easy. As always, you call the shots. Load a disk. Files appear as icons on the disk notepad; to flip through, point at the folded corner and click. Prefer a file appear on a different sheet? Move it. It's easy.



Create a new document or re-name an existing one. Want to copy a file onto the same or a different disk? Fine. Forgotten what a file contains? Select "get info" from the file menu. A description of that file's contents appears. Finished with a file? Print it. Save it. Or drop it in the trash and have done with it. Your call.

geoPaint. A full-featured, color graphics workshop at your fingertips. The pointer operates any one of the fourteen graphic tools and shapes in the drawing menu. Create masterpieces on the Drawing Window. By turns, use a pencil, an airbrush or a paint brush, each with a character all its own. Draw straight lines, squares, rectangles or circles. Fill in with any of the 32 patterns. Switch to pixel-mode, where each dot in a selected section is magnified many times its size for easy manipulation.

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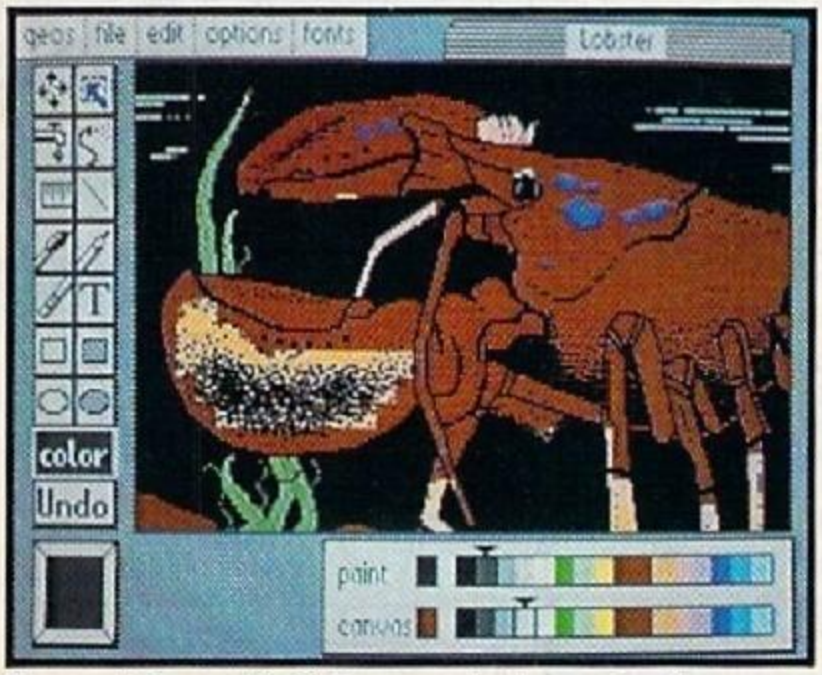
own two Machines.

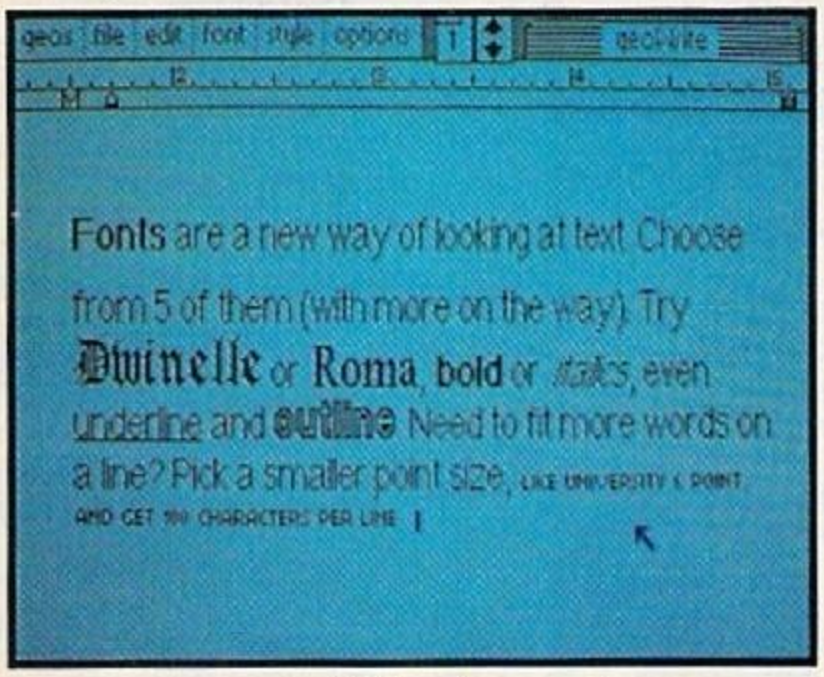
personal computer GEOS™ unlocks.



Second thoughts? Erase what you don't want. Or "UNDO" your last act. (If only life could imitate art!)

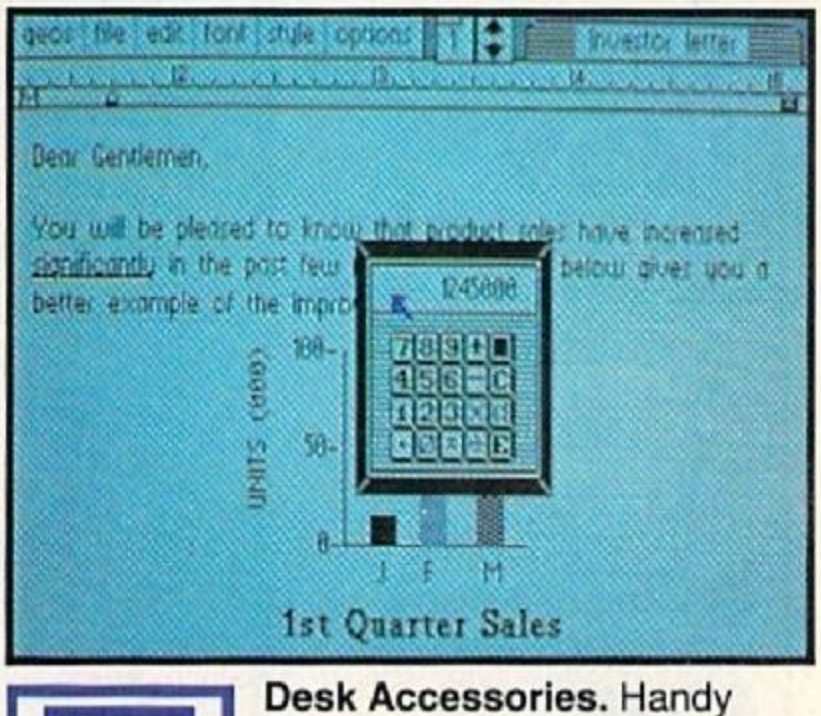
Add text if you like, in different fonts, styles or point sizes. Even change its position or layout at will.

Move or copy any part of your creation. Once done, you can include your artwork in another document—a letter home perhaps. (Won't Mother be pleased?) GEOS makes it easy.


geos | file | edit | font | style | options
geoWrite
Fonts are a new way of looking at text. Choose
from 5 of them (with more on the way). Try
Dwinelle or Roma, bold or italics, even
underline and outline. Need to fit more words on
a line? Pick a smaller point size,

geoWrite. An easy to use, "what you see is what you get" word processor. Create documents. Insert, copy, move or delete text as you wish. Choose from 5 different fonts in many different styles and point sizes. Preview your page exactly as it will appear off the printer. Typists will appreciate tabs, word-wrap and page breaks.

Documents may contain up to 64 pages. What's more, you can move to any page instantly. If you like, you can cut selected text from one section and move or copy it to another. Add graphics from geoPaint. It's a cinch.



Desk Accessories. Handy programs you can use while in any GEOS application. These include an alarm clock, a notepad for reminders, a four-function calculator, and photo and text albums which store pictures and phrases you may then paste into applications. The Preference Manager even lets you establish parameters for everything from mouse speed to the date and time—even background color. Civilized options, every one.

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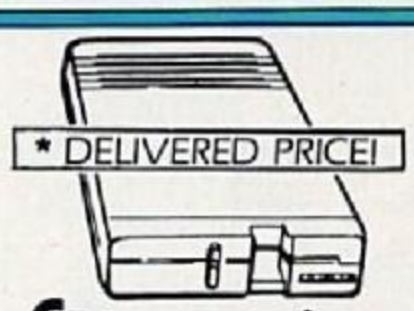

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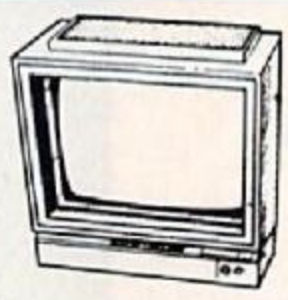

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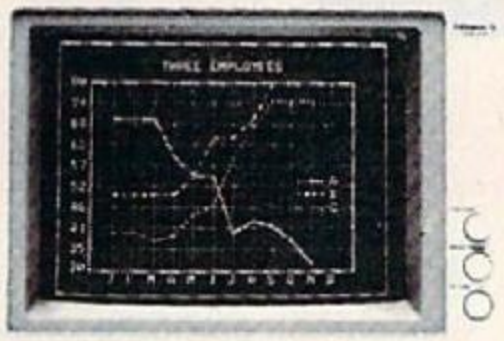

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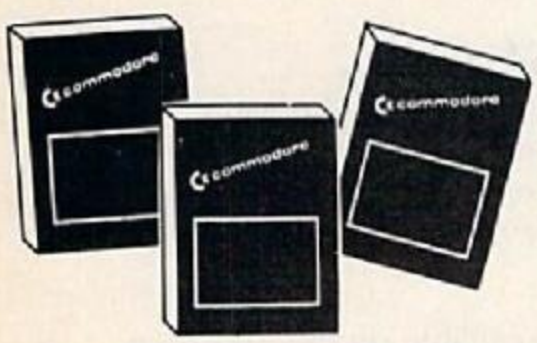

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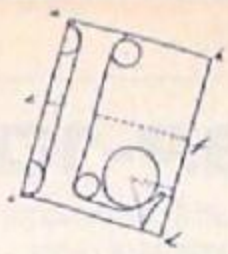

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Cover photograph by Edward Judice

RUN (ISSN 0741-4285) is an independent journal not connected with Commodore Business Machines, Inc. *RUN* is published monthly by CW Communications/Peterborough, Inc., 80 Pine St., Peterborough, NH 03458. U.S. subscription rates $19.97, one year; $29.97, two years; $41.97, three years. Canada and Mexico $22.97, one year, U.S. funds drawn on U.S. bank. Foreign $39.97, one year, U.S. funds drawn on U.S. bank. Foreign air mail subscriptions—please inquire. Second class postage paid at Peterborough, NH, and at additional mailing offices. (Canadian second class mail registration number 9565.) Phone: 603-924-9471. Entire contents copyright 1986 by CW Communications/Peterborough, Inc. No part of this publication may be printed or otherwise reproduced without written permission from the publisher. Programs published in this magazine are for the personal use of the reader; they may not be copied or distributed. **Postmaster**: send address changes to *RUN*, Subscription Services, PO Box 954, Farmingdale, NY 11737. (Send Canadian changes of address to *RUN*, PO Box 1051, Fort Erie, Ontario, Canada L2A 5N8.) Nationally distributed by International Circulation Distributors. *RUN* makes every effort to assure the accuracy of articles, listings and circuits published in the magazine. *RUN* assumes no responsibility for damages due to errors or omissions.

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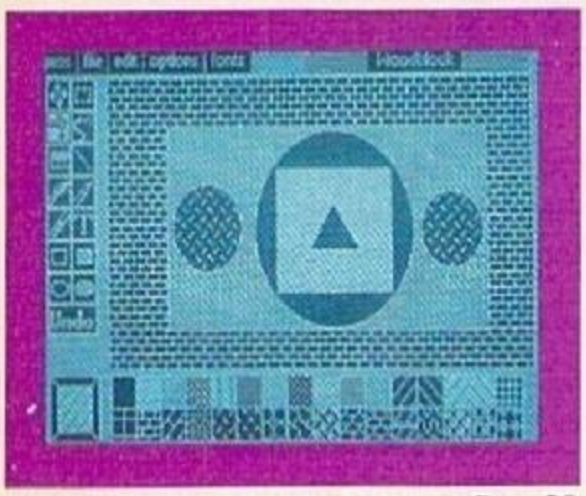

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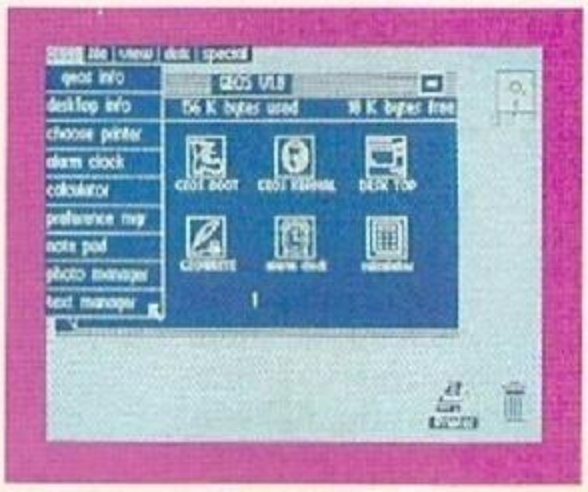
A Message from The Publisher

This month's cover story highlights GEOS (Graphic Environment Operating System), a new bit-mapped operating system from Berkeley Softworks for the C-64 and C-128 line of computers. June marks the first of three consecutive issues that will feature major new product releases and product strategies from Commodore.

In our July issue, *RUN* will feature in detail other new product developments from Commodore, as indicated below. The August issue will close out the series with another exciting development in the telecommunications area.



We feel that GEOS, as well as Commodore's other products and plans, will have a major long-term impact on the current Commodore user community.

Commodore's senior management has informed *RUN* that 1986 will be the year in which Commodore brings together a number of development threads designed to make the C-64 and C-128 expandable single-solution systems, capable of meeting the widest range of needs among home computer users for a very low price.

At the June Consumer Electronics Show, Commodore will introduce a number of hardware enhancements that will tremendously increase the power of the C-64 and C-128. These new products will include mass storage and memory expansion devices, plus new developments in the modem product line. The C-64 will then combine the ease of use of GEOS and the expanded power and memory available through hardware add-ons, as well as several new telecommunications developments from Commodore.

These new announcements will reveal a computer system that has taken a quantum leap in capabilities, as Commodore brings together all of the pieces in its evolving product strategy. These entry-level, low-priced computers will now provide the capabilities of high-end systems, such as the Apple Macintosh, Commodore Amiga, Atari ST and microcomputer systems using GEM.

GEOS will bring you "a whole new world for your Commodore" and greatly enhance the future and installed base of the Commodore product line. As in other high-end bit-mapped systems that shift attention from number of columns to characters per line, GEOS now gives C-64 users an opportunity to set the number of characters per line in a word processing document from 30 to 110 by simply selecting the appropriate font size.

In effect, this negates the long-standing complaint about the C-64's lack of an 80-column capacity. Under GEOS, your documents will support a wide range of printers, from the MPS-1000 dot-matrix through the Apple Image Writer and even the Hewlett-Packard laser printer.

With GEOS and Commodore's planned product introductions, your C-64 or C-128 becomes an entry-level computer with bit-mapped graphics, proportional spacing, variable fonts, laser printer resolution, memory expansion and disk-access speed on a level with the higher-end micros.

With Commodore actively supporting the development of GEOS-based software, we believe that in the near future you'll have a wide variety of GEOS applications from which to choose. In addition to the two applications, geoWrite and geoPaint, which come with GEOS, Berkeley Softworks will be delivering additional applications software. In the fall, you may expect to see geoCalc, geoTerm, geoBase and a desktop publishing program, as well as geoBasic—a new Basic that will fully exploit the GEOS operating system.

We encourage the third-party community to actively support this new operating environment for the C-64 and C-128.

Commodore has, in the past, been known for its high-quality ROM-based operating systems. Now C-64 and C-128 owners can enjoy the benefits of an even more powerful, disk-based operating system, with extensive capabilities to support the full range of professional computer applications that users have come to expect of computers costing many times as much—while still maintaining complete compatibility with all existing C-64 software.

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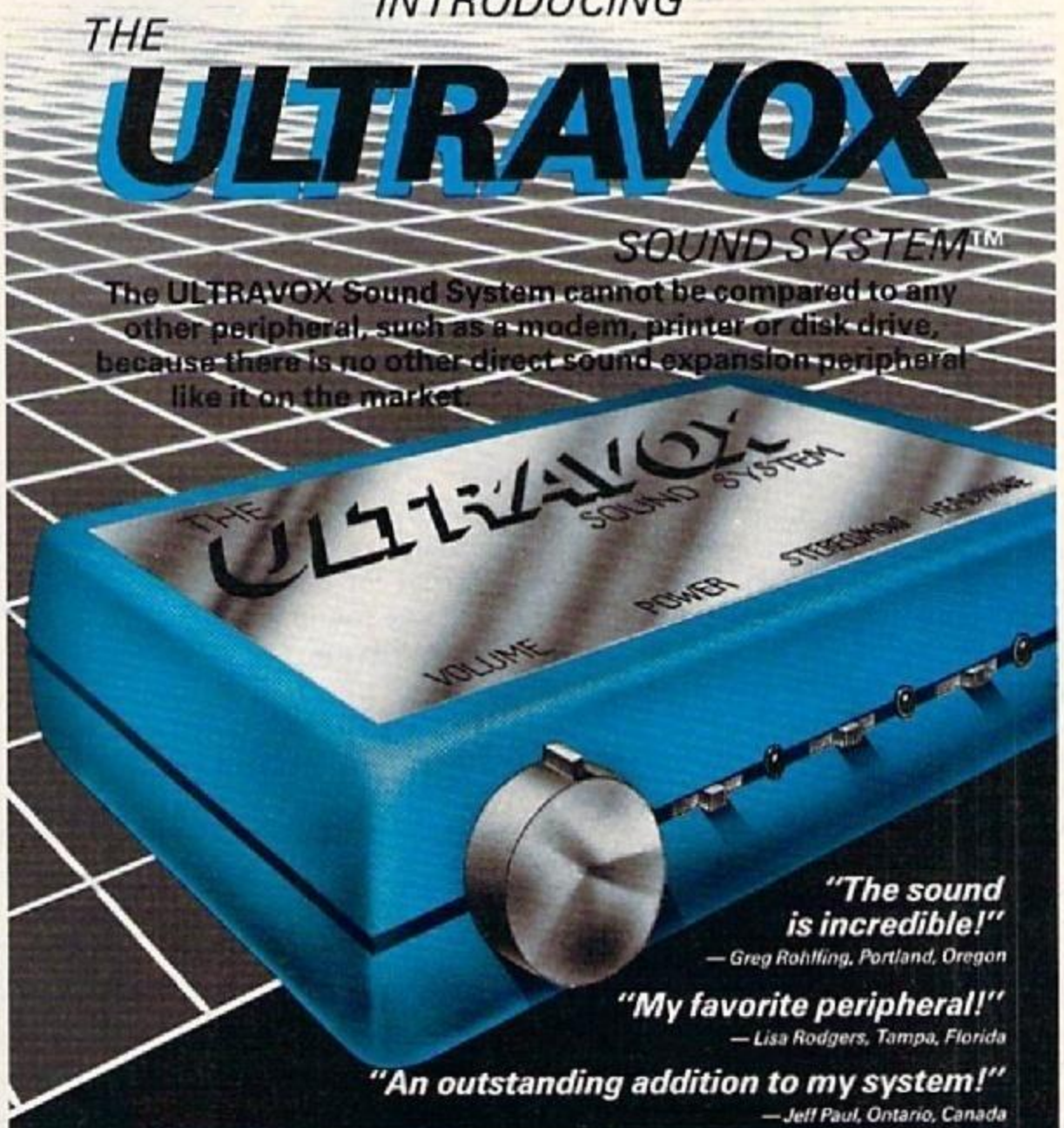

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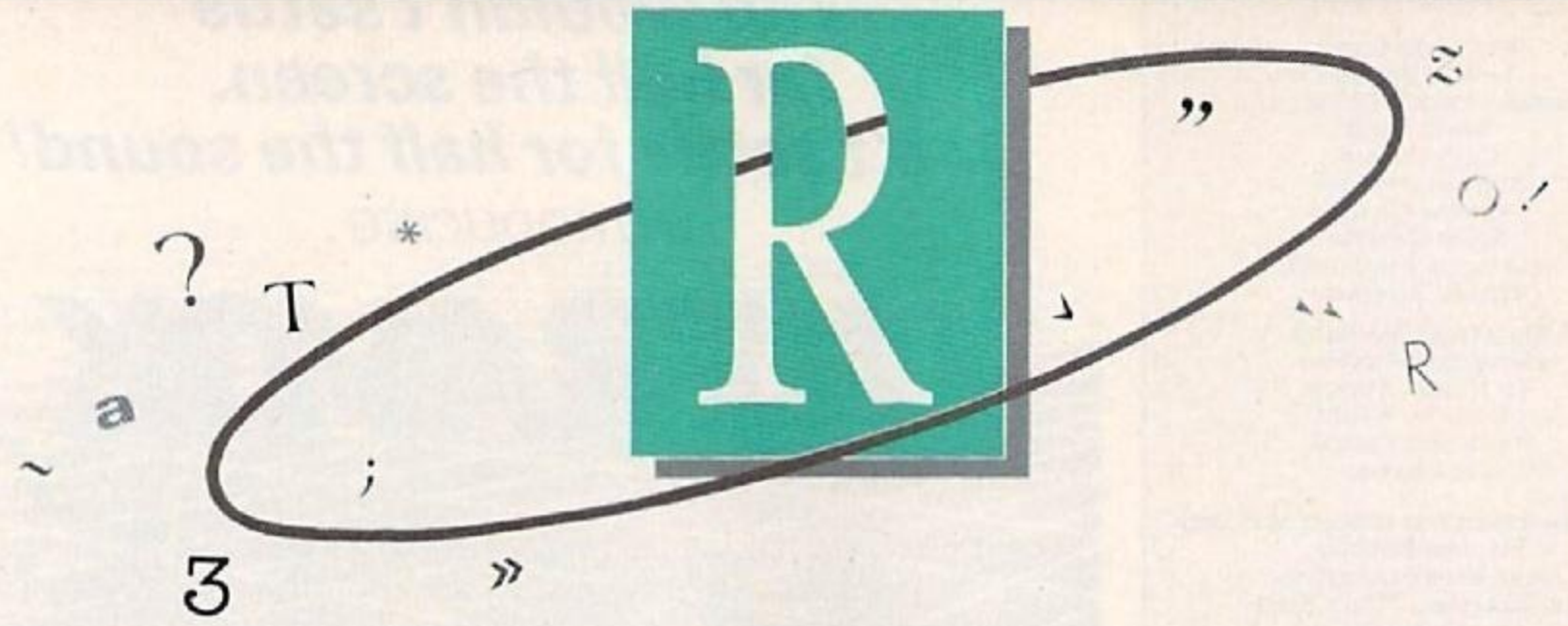

June Highlights

With the introduction of GEOS (this month's cover story), a new chapter is being written in the history of Commodore computing. GEOS opens up a "whole new world for the C-64" with sophisticated applications that rival those found on much higher-priced micros. It promises to greatly increase the capabilities available to C-64 owners.

For the majority of users, GEOS is an introduction to icons, pull-down menus, dialogue boxes, windows and easy file handling using the mouse technology. It's easy and fun to use.

But GEOS is only the beginning. In the coming months we'll be highlighting other Commodore breakthroughs (including a C-128 GEOS) for C-64 and C-128 users. Stay tuned.

This June issue also presents a special focus on education, an area where, quite frankly, Commodore has a lot of catching up to do. It trails both Apple and Radio Shack as the preferred computer in the schools.

However, Commodore *is* attempting to beef up its support of the education market, as Pat Walkington, manager of Commodore educational marketing, explains in this month's Resource Center. Some of the ways in which Commodore plans to support the educational market include:

—a network of over 100 authorized education dealers who give advice and recommendations to schools about the purchase of Commodore hardware and software.
—School Service Program, which trains school personnel in the maintenance of Commodore equipment.
—support of third parties in the development of quality educational software for the C-64 and C-128.
—bundling of educational software samplers with new computers.
—support of national educational projects such as the Young Astronaut Program.

Commodore does have its loyal supporters in the educational ranks, but they are clearly outnumbered by the supporters of Apple, which holds a solid grip on the U.S. educational market. However, this is not the case in Canada, where, as you will read in this issue (see p. 62), Commodore is the only concern (with 67 percent of the market).

The situation confronting the U.S. school administrator and teacher is how to make the most out of the available educational money for computers. Teachers cite the low cost, inexpensive maintenance, dependability, software availability and superior graphics and sound capabilities as factors in selecting Commodores for their schools.

One second-grade teacher who is motivating her students to learn through creative uses of the C-64 states, "I can have at least six of my 28 students on the computers at one time, instead of just two with a more expensive brand." The article then goes on to discuss why, in this teacher's mind, C-64s are better suited for the classroom than Apples or IBMs.

School administrators and teachers should, of course, carefully consider how their educational dollars can best be spent. If you decide that computers in the classroom are the way to go, then Commodore computers are probably the *best* way to go, if best means low cost *and* quality. With the introduction of the C-128, in addition to the C-64, Commodore clearly offers the most capabilities for the least cost for this market.

This same sentiment, as well as the problems and frustrations that Commodore is experiencing in trying to make up ground in the educational market, are further summed up in this issue by Kathy Hurley, vice-president of Grolier, a leading educational software manufacturer:

"Commodore. . . doesn't put enough money behind its educational marketing. . . but it has a good-priced product with a lot of performance."

The above-mentioned articles all focus specifically on the educational use of computers in schools. But there's another important area that should not be overlooked—the educational use of computers in the home and the parents' responsibility for the education of their children.

This issue also presents an educational application that parents with computers can share with their youngsters. Arithme-Sketch (p. 66) is an entertaining program that teaches and rewards students while reinforcing their math skills.

db

New Bulletin Board Number

The *RUN* technical and editorial offices have recently changed locations, necessitating new phone lines and a new phone number for the RUNning Board. We invite you to give us a call at the new number, 603-924-9704, to find out the latest information about *RUN* magazine and the Commodore industry.

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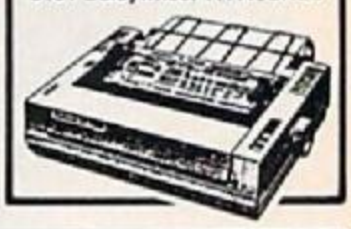

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Compiled by LOUIS F. SANDER

MAGIC is tricks, MAGIC is fun. MAGIC is doing what cannot be done.

Every month, Magic brings you brief and useful computer tricks from around the world—tricks to make computing easier, more enjoyable or more exciting. We number our tricks in hex, the counting system of sorcerers and computerists.

Magic solicits your simple hardware ideas, short programs, useful programming techniques, little-known computer facts and similar items of interest. We look for new or recycled material that can be implemented with a minimum of time, effort or theoretical knowledge and that is of current value to Commodore computerists (Plus/4 and C-16 owners, too). RUN will pay up to $50 for each trick accepted. Send your tricks to:

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If you enclose a self-addressed stamped envelope, we'll send you a Trick Writer's Guide. Readers outside the United States may omit the stamp.

June, the conventional wisdom says, signifies the start of a slow time for computing. But mark Magic's mighty mailbox; the truth is indeed the opposite—our summer mail is the heaviest of the year. So behold a surely proven truth: the Siren Song of Silicon transcends the Lure of the Great Outdoors.

What you see below was created while Winter held her icy grip, and while long, dark nights gave plenty of time to refine and polish the Magic. It's heavy in telecommunications and practical programs, plus the usual dose of amusements. As always, we know you'll enjoy it.

$2EF File finder—This routine can be used to check for the presence of a given file on the disk and to determine whether the disk is write-protected. It's useful to make such checks before attempting to manipulate a potentially unavailable file.

If the file named Filename is not on the disk, line 130 will give an error 62, File Not Found. If the disk is write-protected, that line will give an error 26, Write Protect On.

If you don't need to check for write protection, replace the Open statement's A (for append) with an R (for read).

```
100 REM FILE FINDER - LOUIS F. SANDER
110 OPEN2,8,2,"FILENAME,P,A":CLOSE2
120 OPEN15,8,15:INPUT#15,A,B$:CLOSE15
130 IFA>1THENPRINTA,B$:END
140 PRINT"THE FILE IS ON THE DISK"
```

Louis F. Sander
Pittsburgh, PA

$2F0 GET with flashing cursor—This routine provides a blinking cursor for the Get statement. It doesn't have the cursor footprint problems usually inherent in such routines, and it allows input from all keys, including the cursor, delete and color keys. The routine works as is on the VIC, C-64 and in both modes on the C-128.

```
1000 REM MAGIC GET W/CURSOR - ED HORGAN
1010 REM FOR C64,VIC,C128 IN BOTH MODES
1020 X=235:Y=236:IFFRE(0)=FRE(1)THENX=214:Y
     =211
1030 Z=1024+PEEK(X)*40+PEEK(Y):ZZ=PEEK(Z)
1040 POKEZ,160:GETA$:POKEZ,ZZ:IFA$=""THEN10
     40
1050 PRINTA$;:B$=B$+A$:IFA$=CHR$(13)THENGOT
     O1070
1060 GOTO1030
1070 PRINTB$;"REST OF PROGRAM GOES HERE"
```

Edward Horgan
Coatesville, PA

$2F1 Datapointer for the C-64—This program sets up a machine language routine that can set the data pointer to any Data statement you choose, regardless of its line number. This eliminates the need for arrays to hold data the program already contains, letting you write smaller programs with faster execution and starting.

Once the machine language is in memory, load the Basic program containing the Data statements you need to access. To access the Nth Data statement in the program, just make the indicated Poke and SYS call, then execute a Read statement. You are limited to 255 Data statements, if you consider that a limit.

Datapointer accesses statements rather than individual data items, but once a statement has been accessed, your program can read all the items it contains. Data statements can, of course, stand by themselves or be embedded within multi-statement lines. It's fastest to put them at the beginning of your program.

```
100 PRINT"{SHFT CLR}MAGIC C64 DATAPOINTER -
    EDWARD G. BELL"
```

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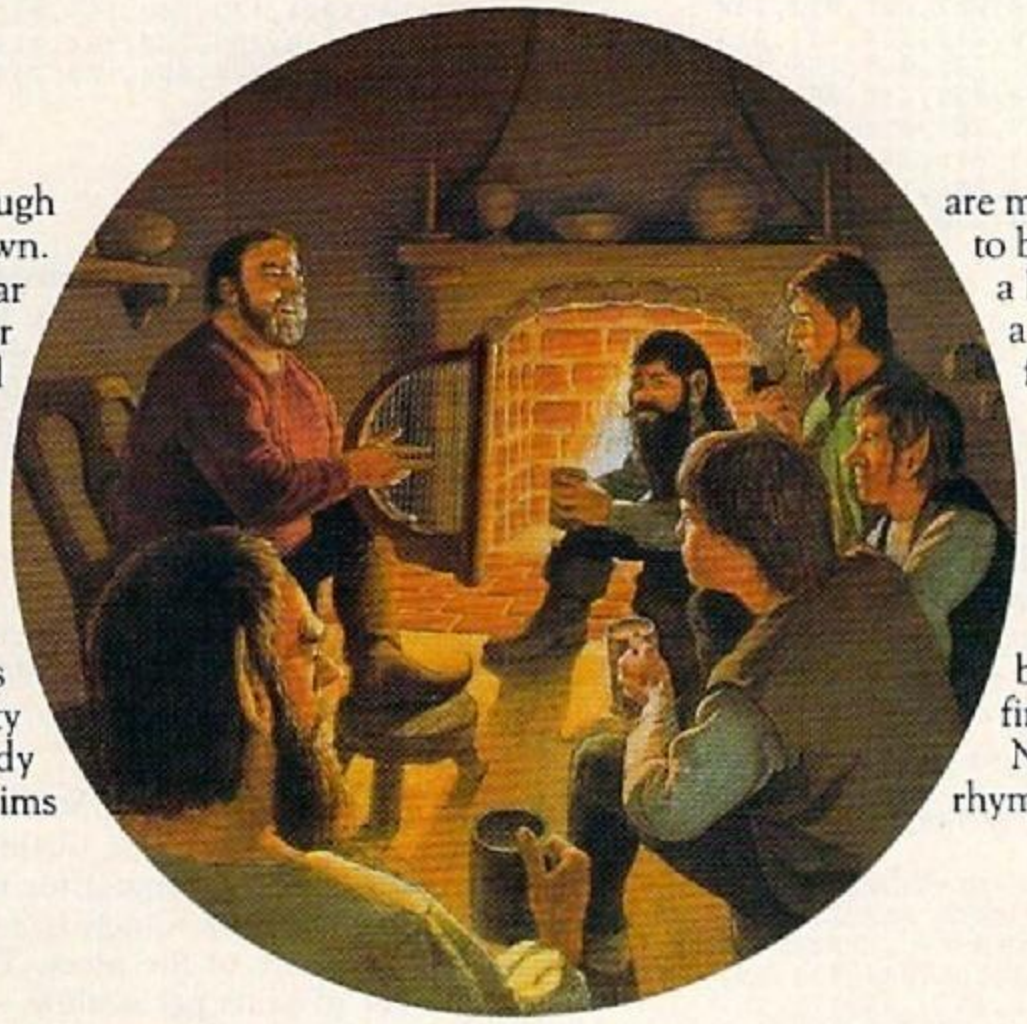
(No I.D. required for half-elves.)

When the Going Gets Tough, the Bard Goes Drinking.

And the going is tough in Skara Brae town. The evil wizard Mangar has cast an eternal winter spell. Monsters control the streets and dungeons beneath. Good citizens fear for their lives. What's worse, there's only one tavern left that serves wine.

But the Bard knows no fear. With his trusty harp and a few rowdy minstrel songs he claims



are magic, the Bard is ready to boogie. All he needs is a band of loyal followers: a light-fingered rogue to find secret doors, a couple of fighters to bash heads, a conjurer to create weird allies, a magician for magic armor.

Then it's off to combat, as soon as the Bard finishes one more verse. Now what's a word that rhymes with "dead ogre?"

The Bard's Tale
Skara Brae
Press Any Key...
Character Name AC Hits Cond SpPt Cl
BRIAN THE FIST -9 101 101 0 Pa
EL CID -9 96 96 0 Ba
MARKUS -9 88 88 0 Ro
MERLIN -9 94 94 111 Ui
SIR GRADY 4 64 64 78 So
OMAR 2 62 62 113 Ma

4 classes of magic user, including wizard and sorceror. 85 new magic spells in all.

The Bard's Tale
You are startled by a grim snarl. Before you, you see 1 Red dragon.
Will your stalwart band choose to (F)ight or (R)un?
Red dragon
Character Name AC Hits Cond SpPt Cl
BRIAN THE FIST -9 101 101 0 Pa
EL CID -9 96 96 0 Ba
MARKUS -9 88 88 0 Ro
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SIR GRADY 4 64 64 77 So
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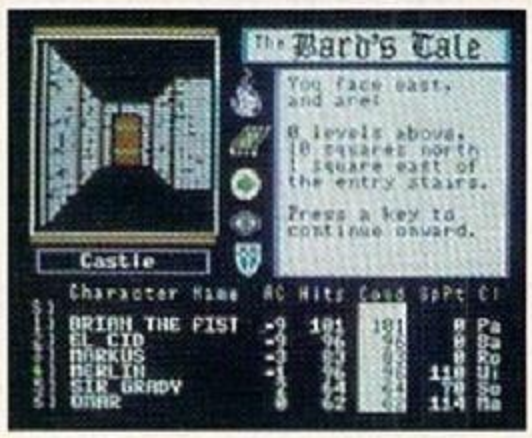
The Bard's Tale
You face east, and are at
0 levels above, 10 squares north & 1 square east of the entry stairs.
Press a key to continue onward.
Castle
Character Name AC Hits Cond SpPt Cl
BRIAN THE FIST -9 101 101 0 Pa
EL CID -9 96 96 0 Ba
MARKUS -9 88 88 0 Ro
MERLIN -9 94 94 110 Ui
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Listing continued.

```
11Ø FORJ=1TO82:READK:CS=CS+K:NEXT:RESTORE:I
    FCS<>11Ø53THENPRINT"DATA ERROR":END
12Ø FORJ=679TO76Ø:READK:POKEJ,K:NEXT
13Ø PRINT"{CRSR DN}TO GET NEXT DATA FROM TH
    E NTH STATEMENT,"
14Ø PRINT"READ IT AFTER POKE254,N:SYS679"
141 DATA169,ØØØ,133,251,169,Ø08,133,252
142 DATA16Ø,Ø05,162,Ø01,177,251,2Ø1,131
143 DATA24Ø,Ø14,Ø32,23Ø,Ø02,2Ø1,Ø32,24Ø
144 DATA243,2Ø1,Ø58,24Ø,239,Ø24,144,Ø15
145 DATA228,254,2Ø8,Ø07,132,Ø65,165,252
146 DATA133,Ø66,Ø96,232,Ø32,23Ø,ØØ2,177
147 DATA251,Ø32,23Ø,ØØ2,2Ø1,Ø58,24Ø,212
148 DATA2Ø1,ØØØ,24Ø,ØØ9,Ø76,214,ØØ2,2ØØ
149 DATA2Ø8,ØØ2,23Ø,252,Ø96,152,Ø24,1Ø5
15Ø DATAØØ4,144,ØØ3,Ø24,23Ø,252,168,Ø24
151 DATA144,186
```

Edward G. Bell
Swissvale, PA

$2F2 C-64 line counter—This relocatable program for the C-64 and VIC gives an accurate count of the lines in any Basic program. It is useful, among other things, for determining how many lines to list on each page of a printout. To use the line counter, load and run it, taking careful note of the SYS command on the screen. Then load the program whose lines are to be counted and execute the SYS.

```
1ØØ PRINT"{SHFT CLR}MAGIC LINE COUNTER - JA
    MES PELLECHI"
11Ø SA=828:PRINT"{CRSR DN}SYS";SA;"TO COUNT
    ":REM RELOCATABLE!
12Ø FORJ=ØTO41:READK:CS=CS+K:NEXT:RESTORE:I
    FCS<>7462THENPRINT"DATA ERROR":STOP
13Ø FORJ=ØTO41:READK:POKESA+J,K:NEXT
14Ø DATA165,Ø43,133,251,165,Ø44,133,252
15Ø DATA16Ø,ØØØ,132,253,132,254,177,251
16Ø DATA17Ø,2ØØ,177,251,24Ø,Ø13,23Ø,253
17Ø DATA2Ø8,ØØ2,23Ø,254,134,251,133,252
18Ø DATA136,24Ø,235,165,254,166,253,Ø76
19Ø DATA2Ø5,189
2ØØ REM ABOVE IS FOR C-64. FOR VIC-2Ø, ADD
    LINE 21Ø POKESA+41,221
```

James Pellechi
Middle Island, NY

$2F3 Printer-width fix—This C-64 and VIC-20 program lets you print program listings in any desired width. With it, you can use any size paper for your listings, or you can leave wide right margins for comments.

The first printed line of any program line is flush with the left margin, while succeeding lines are indented any number of spaces you choose. Default values are 64 column listings, with four-space indentation of unnumbered lines. They can be changed by Poking as indicated in the program.

To use the program, run it, load the program to be listed, then Poke 807,3. Simultaneously pressing the run/stop and restore keys will disable the special listing mode.

```
1ØØ PRINT"{SHFT CLR}MAGIC PRINTER WIDTH FIX
     - JAMES F. LEES":REM C64 & VIC
11Ø FORJ=1TO57:READK:CS=CS+K:NEXT:RESTORE:I
    FCS<>7554THENPRINT"DATA ERROR":STOP
12Ø FORJ=957TO1Ø13:READK:POKEJ,K:NEXT:SYS95
    7
13Ø PRINT"{CRSR DN}POKE 976,PRINT WIDTH{2 S
    PACEs}(NOW";PEEK(976);"{CRSR LF})"
14Ø PRINT"{CRSR DN}POKE 989,INDENTATION{2 S
    PACEs}(NOW";PEEK(989);"{CRSR LF})"
15Ø PRINT"{CRSR DN}POKE8Ø7,3 ENABLES, STOP/
    RESTORE KILLS."
151 DATA173,Ø38,ØØ3,141,238,ØØ3,173,Ø39
152 DATAØØ3,141,239,ØØ3,Ø96,Ø72,2Ø1,Ø13
153 DATA24Ø,Ø33,169,Ø64,197,252,2Ø8,Ø21
154 DATA169,Ø13,Ø32,237,ØØ3,132,253,16Ø
155 DATAØØ4,132,252,169,Ø32,Ø32,237,ØØ3
156 DATA136,2Ø8,25Ø,164,253,23Ø,252,1Ø4
157 DATAØ76,ØØØ,ØØØ,169,255,133,252,2Ø8
158 DATA244
```

James F. Lees
Dayton, OH

$2F4 Tempo and the metronome—While the tones in computer music are usually faithful to the composer's intent, there's often something wrong with the music's speed, or tempo. There's no need for such a discrepancy, because the proper tempo is always specified on the sheet music by an Italian word such as Largo, Andante or Allegro. Musicians know the meanings of these words, but, unfortunately, computers don't.

Luckily, much sheet music also includes a numerical metronome setting that the computer can easily digest. The setting is found at the start of the piece, usually in the form:

M.M. [note] = [number]

The M.M. stands for Maelzel's Metronome. (Maelzel developed the first one in the early 19th century.) The [note] will be the symbol for the note, usually a quarter note or half note, which is counted as one beat in the time signature of the piece. The [number] signifies the number of beats per minute, often somewhere between 60 and 80, but with a practical range of about 50–120.

When you establish the tempo for your computer music, just be sure there are the appropriate number of notes per minute of music played.

On the C-128, the Tempo statement can be used for this, if you know the following formulas:

TEMPO = beats per minute / note value / 3.12

beats per minute = TEMPO × note value × 3.12

TEMPO is the appropriate argument for the Tempo statement, while note value is 1 for a whole note, 2 for a half note, 4 for a quarter note, and so on. The note value and number of beats per minute are, of course, taken from the metronome setting.

While the Tempo statement takes arguments from 1–255, only those in the lowest part of that range are useful in making music. Using a quarter note for one beat, Tempos from four to ten cover the range of 49 to 124 beats per minute. Using a half note for one beat, Tempos from 8–20 cover the same range.

Jean Patterson
Pittsburgh, PA

$2F5 C-128 error trapping—When programming the C-128, add the following three lines, numbered exactly as shown. If your program encounters an error, these lines will tell you what kind it is and where it is. The offending line will even be listed to the screen.

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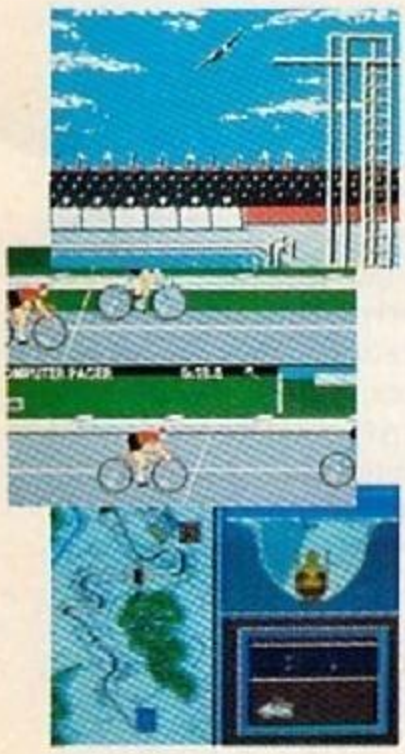

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```
Ø TRAP63999:REM MAGIC - A.OZERKOVSKY
63998 PRINT"THE PROGRAM IS OK!":END
63999 PRINTERR$(ER);" ERROR IN LINE";EL:HEL
      P
```

Alejandro Ozerkovsky
Mexico City
Mexico

$2F6 C-128 terminal program—This little gem demonstrates the power and flexibility of the mighty C-128. Where else can you find a terminal program that fits on a single line?

```
1Ø REM MAGIC C128 TERMINAL - J.PAYNE
2Ø POKE56577,Ø:POKE56579,38:OPEN1,2,3,CHR$(
   6)+CHR$(Ø):DO:GETA$:GET#1,B$:IFA$<>""THE
   NPRINT#1,A$;:LOOP:ELSEIFB$<>""THENPRINTB
   $;:LOOP:ELSELOOP
```

Jim Payne
Dover, DE

$2F7 C-128 function keys—This bit of magic lets you redefine the C-128's help key and shifted run/stop keys, as long as you run it before any of the function keys have been redefined. If you want the new definition to include a carriage return, use the left-arrow key where you want the return to appear.

If you know how the function keys are set up in memory, you can modify the program to accommodate your creative wishes. Locations 4096–4351 are reserved for the function keys. Locations 4096–4105 hold the lengths of each key definition, from f1 through f8, then shifted run/stop, then help. The definitions themselves are stored from 4106–4351.

Basic's Key command manages the first eight definitions, while a program such as this can manage the ninth and tenth.

You can save the setups for all ten keys by using

```
BSAVE "filename", P4096 TO P4351
```

They can be reloaded at any time by

```
BLOAD"filename"
```

```
1Ø PRINT"{SHFT CLR}MAGIC EXTRA C128 F-KEYS
   - GARY KEMPER"
2Ø INPUT"{CRSR DN}RUN/STOP KEY DEFINITION";
   R$
3Ø INPUT"{CRSR DN}{4 SPACEs}HELP KEY DEFINI
   TION";H$
4Ø POKE41Ø4,LEN(R$):POKE41Ø5,LEN(H$)
5Ø FORJ=1TOLEN(H$+R$)
6Ø B=ASC(MID$(R$+H$,J,1))
7Ø IFB=95THENB=13
8Ø POKE4158+J,B
9Ø NEXT
```

Gary Kemper
Azusa, CA

$2F8 Halley's Comet revisited—If you missed the prime viewing period for our once-in-a-lifetime visitor, this C-64 program can show you what you missed. It gives a computer-enhanced image of the famous heavenly body, complete with color and sound.

```
1Ø PRINT"{SHFT CLR}{CTRL 2}HALLEY'S COMET -
    TAMMY SILVERBERG/MAGIC"
2Ø POKE53281,Ø:FORJ=1TO52:PRINTTAB(5)"{6 SP
   ACEs}*{6 SPACEs}*{3 SPACEs}";:NEXT:PRINT
   "{HOME}"
3Ø S=54272:FORJ=ØTO24:POKES+J,Ø:NEXT:POKES+
   24,15:POKES+1,1:POKES+5,22Ø
4Ø V=53248:FORJ=ØTO62:READK:POKE832+J,K:NEX
   T:POKE2Ø4Ø,13:POKEV+21,1:POKEV+28,1
5Ø POKEV+37,7:POKEV+38,2:POKEV+39,8:POKES+4
   ,129
6Ø FORX=1TO255STEP.5:POKEV+1,255-X:POKEV,X:
   NEXT
61 DATA ØØØ,ØØØ,252,ØØØ,Ø15,255,ØØØ,Ø15
62 DATA 255,ØØØ,Ø63,255,ØØØ,Ø63,255,ØØØ
63 DATA Ø63,255,ØØØ,247,255,ØØØ,223,252
64 DATA ØØØ,125,124,ØØØ,117,24Ø,ØØ1,Ø95
65 DATA 192,ØØ1,Ø93,ØØØ,ØØ1,Ø84,ØØØ,ØØ5
66 DATA Ø8Ø,ØØØ,ØØ6,Ø64,ØØØ,Ø22,Ø64,ØØØ
67 DATA 17Ø,ØØØ,ØØØ,168,ØØØ,ØØØ,16Ø,ØØØ
68 DATA ØØØ,ØØØ,ØØØ,ØØØ,ØØØ,ØØØ,ØØØ
```

Tammy Silverberg
Brooklyn, NY

$2F9 Super-simple scheduling program—I'm in charge of scheduling and reservations for our Lions Club hall. I used a paper calendar for six months, but with all the reservations, cancellations and conflicts, I decided to put my computer to use. I started by writing a Basic program using Data statements. However, with our very heavy schedule, the program became monstrous and time-consuming.

I finally came up with a program that contains only one executable line and operates in real time. I don't know that it is unique, but in my computer-conscious small community, no one has ever seen the like.

The secret is to use one line for each day, with the line number consisting of a 1 followed by the month and day in four-digit form. The line number for June 8 would be 10608; for Halloween, it would be 11031; and so on. After some dates have been scheduled, the program might look like this:

```
10 LIST 10000-
10112 BINGO TONIGHT
10113 SWIM PARTY AT 8:00
10114 LUNCHEON
```

and so on, with up to 80 characters per line.

The beauty of the program is that lines are never executed, so they needn't be syntactically correct. To access the lines, you simply load and run the program. You can make monthly or quarterly printouts by listing to the printer. If all your information won't fit on one line, end the line with SEE xxxxx, where xxxxx is an unused line number above 20000. After a date has passed, you may delete it by typing its line number; you can then save the file by using the Save with Replace command.

If you adopt this system for your own purposes, be careful not to use question marks in your entries, since the computer will convert them to Print statements. Also, to guard against reserving the same date twice, always list the program before making a new entry.

John T. McClennan
Point Arena, CA

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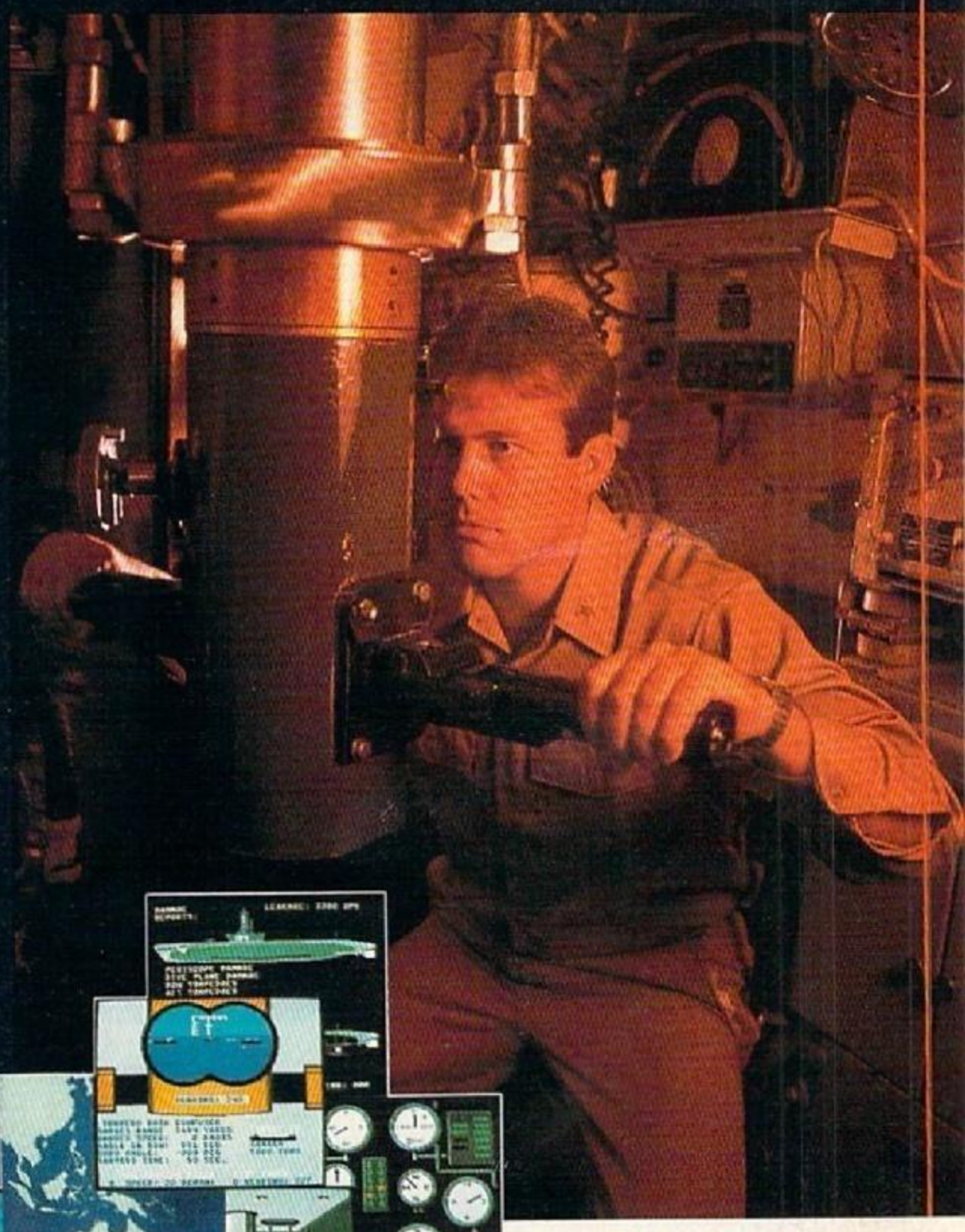

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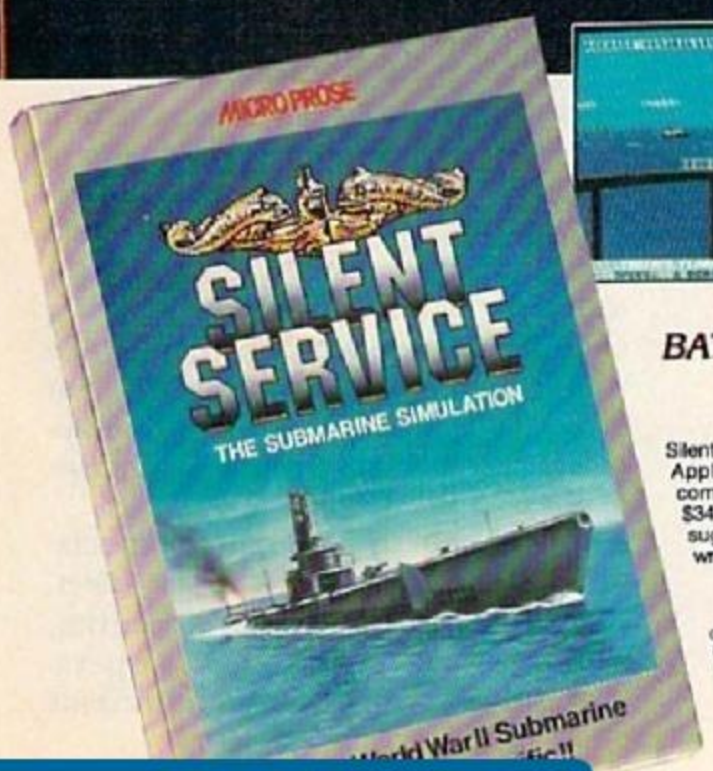

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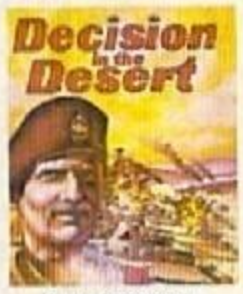

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Compiled by SUSAN TANONA

Chem Lab

Here's a Chance To Brush Up on Your Lab Skills

From the moment you pick up the manual, you can't help but be impressed with Chem Lab. The hard cover opens to reveal a spiral binding with 70 pages of well-organized instructions.

It's clear that Chem Lab's authors are trying very hard to make chemistry fun. Fifty experiments are presented as mystery problems with catchy names that defy association with more traditional concepts of scientific instruction. Rats, Bar Exam and A Steely Deal are but three of the problems presented to allow you to sharpen your lab skills.

Touted as "a chemistry set inside your computer," with no mess to clean up afterward, Chem Lab is an innovative way to introduce youngsters to the names of the elements and some of the basic concepts of chemistry.

After choosing an experiment from one of three levels of difficulty, you must accurately type in your selection before the program will proceed. Chem Lab only accepts your instructions when the names of the elements are correctly spelled or represented by the accurate chemical formulas.

To begin an experiment, you must first select the proper equipment. A robot arm, controlled by the cursor keys, positions beakers, condensers, dryers and other glassware atop your lab bench. Another robot arm is used to transfer gases, pour liquids and scoop solids. These devices are colorfully represented by graphics figures that move about the screen to the accompaniment of various musical clicks and bleeps.

Once you've equipped your lab, you may begin to mix chemicals. Three menus list the liquid, solid and gaseous elements available for each experiment. Liquids squirt colorfully from the spigot into beakers and flasks. You must carry solids from a dispenser to a container, and gases are piped from a complex of storage tanks.

You can encourage chemical reactions by applying the flame of a burner to the bottom of a vessel or by superheating or pressurizing the entire laboratory. Gases produced can be purified, condensed to a liquid or simply collected, depending on your choice of labware.

Chemistry is a field where failure is sometimes more spectacular than success. While Chem Lab never fills the house with smoke, it does allow the budding chemist to fail. Failures usually rate a short message and the opportunity to begin again. Unfortunately, there's no avoiding the tedious trips to the storeroom for equipment or the other preliminary steps that paved the way to your last mistake.

While this might only be a minor complaint, the frequency with which failures occur points to a serious shortcoming. Repeating failed experiments can be both tedious and frustrating. In addition, Chem Lab offers very little assistance in solving the problems and completing the experiments.

Extensive instructions on how to operate the program make starting out easy, but neither the documentation nor the program provide tutorial information adequate to turn this game into a serious educational tool. Chem Lab offers the budding chemist an opportunity to practice what he or she already knows, but someone who doesn't have an appetite for the elements may soon tire of these blind trials.

Chem Lab raises higher expectations than it seems able to meet. Despite sophisticated packaging, wonderful graphics and easy operation, this package eventually reveals

Report Card

A ***Superb!*** An exceptional program that outshines all others.

B ***Very Good.*** One of the better programs available in its category. A worthy addition to your software library.

C ***Good.*** Lives up to its billing. No hassles, headaches or disappointments here.

D ***Mediocre.*** There are some problems with this program. There are better on the market.

E ***Poor.*** Substandard, with many problems. Should be deepsixed!

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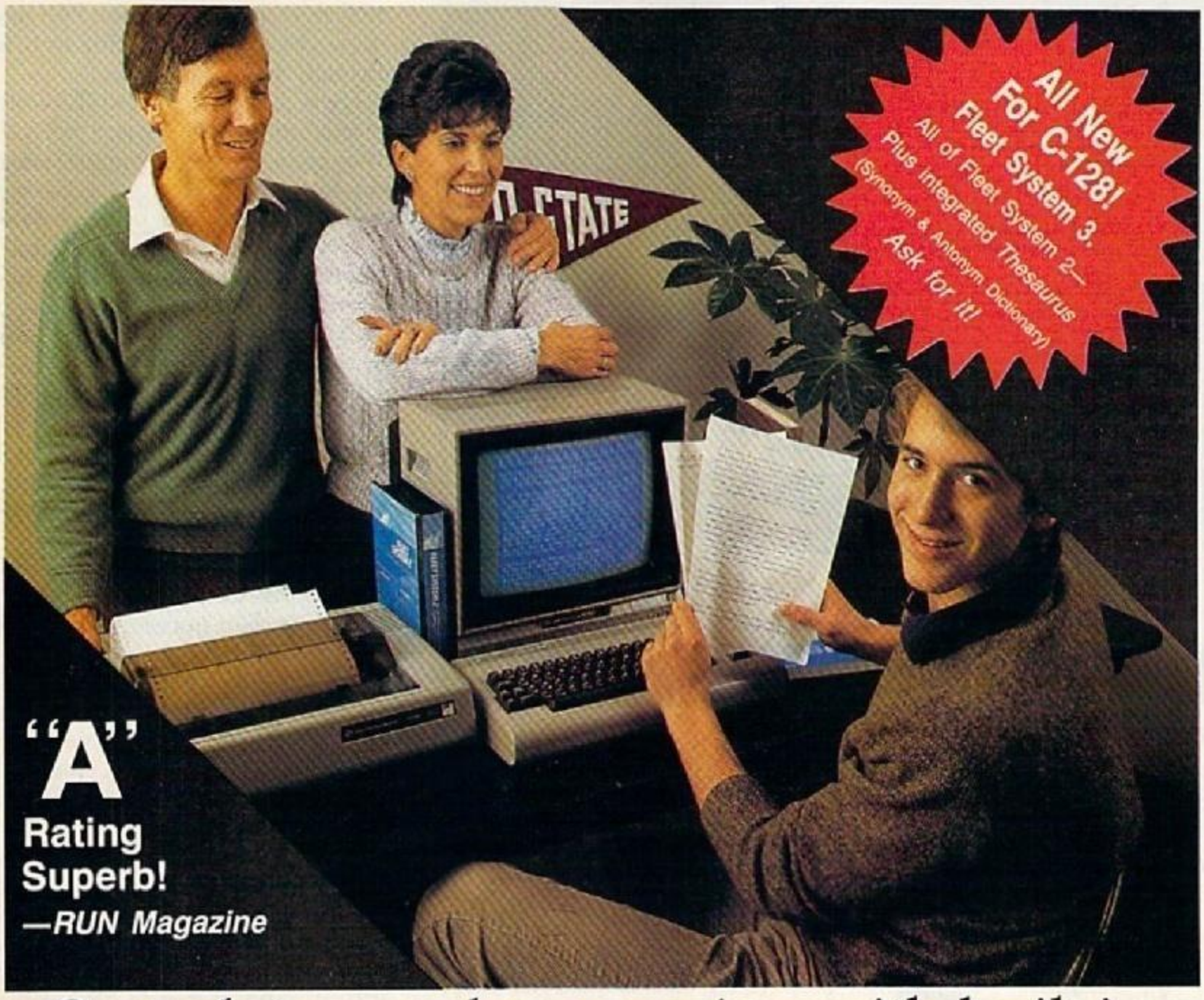

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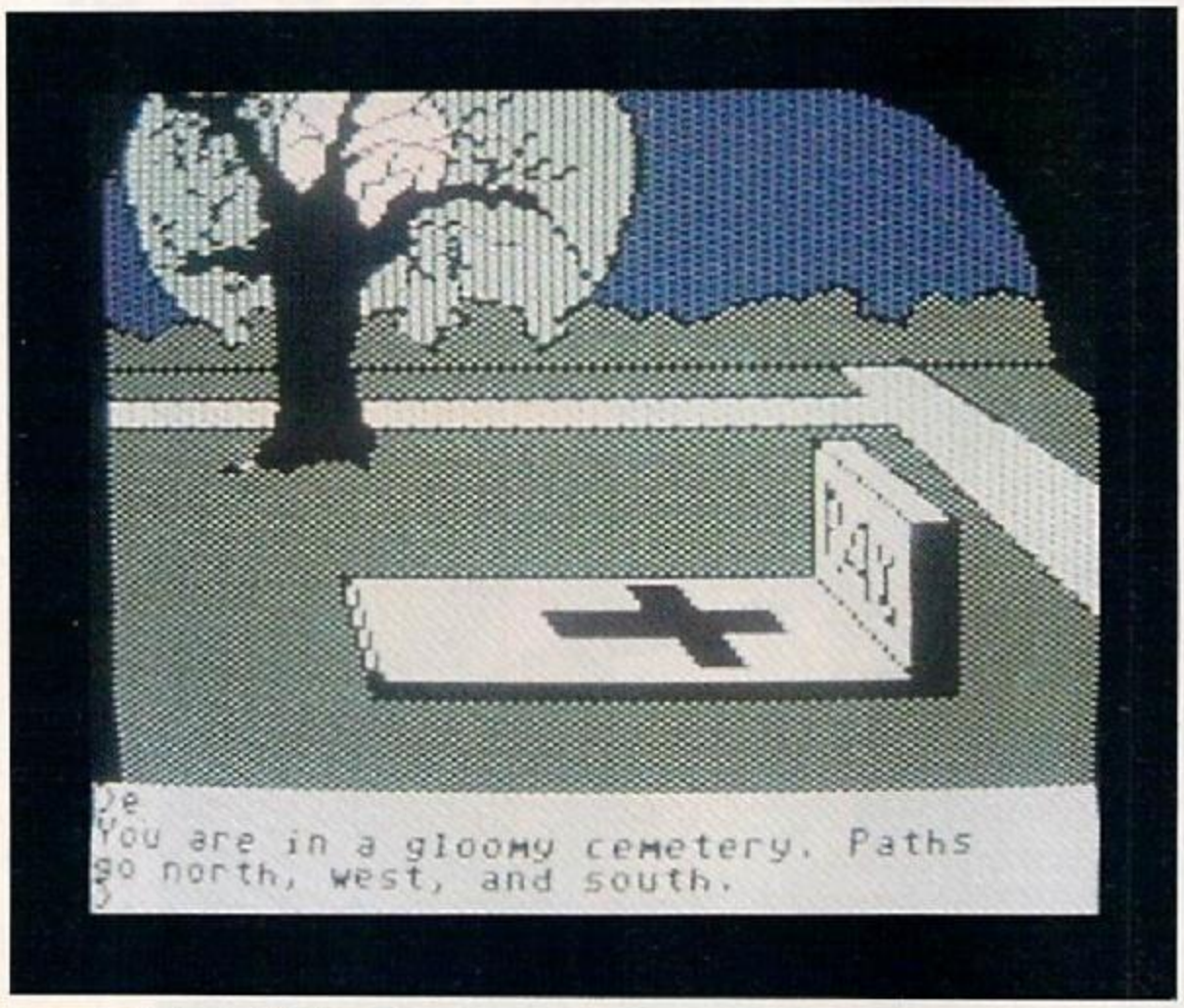

Penguin Software's Transylvania.

itself to have only limited staying power. *(Simon & Schuster Computer Software, One Gulf and Western Plaza, New York, NY 10023. C-64/$39.95 disk.)*

John Premack
Lexington, MA

Transylvania B

This Updated Version Of a Classic Adventure Won't Disappoint You

In this adventure, your quest is to plumb the forests of Transylvania, brave the evils of the night and find the kidnapped Princess Sabrina before dawn.

If you think you've been there before, think again: Transylvania has been rewritten and an award-winning graphics adventure has become even better.

Transylvania has a new, interactive parser routine called Comprehend, which has a vocabulary of more than 1000 words and can understand full-sentence and even multiple-sentence commands, as well as new locations (rooms) and new puzzles.

Included in the package are documents that set the scene and may or may not provide clues. There is a letter from King John, begging that you find his daughter (although his finest soldiers have failed) and directing you to call on the wizard Zin, whose calling card is included in the package.

Then there is the newspaper, the *Wallachian Herald*. I suggest you read every word of it carefully and keep it close at hand.

In the beginning, you'll find yourself in the middle of the Transylvanian forest. The scene is well-drawn, as is every scene in this graphics adventure. To move, you may specify directions by typing them in full or by abbreviating them (N,S,E,W).

Your commands and the game's replies are contained in a narrow space at the bottom of the screen. Pressing the return key at any time flips the picture off the screen, allowing you to review the last several moves. It would probably be possible to play this game as an all-text adventure and thus speed things up, but you'd miss a lot of the game's charm and the visual clues.

As with all adventures, you'll want to pick up all the detail you can; read every note and inscription; examine each new scene carefully. You never know where your next clue or breakthrough may come from.

There is also a werewolf involved in this adventure. (There are other things, too, moving through the night, but they are "offstage.") The werewolf is a clear and present danger through your first moves, and it seems the only way to escape being devoured when he appears in your path is to reverse your last move. Otherwise, the werewolf has you for a snack and you are offered a chance to restart the novel.

Once into the game, you may get the feeling it does not play fair: If, for example, you are in the meadow with the goblin and choose to go north to the red hut, you'd think a move south would take you back to the goblin. Not necessarily. You may end up elsewhere.

Although it is frustrating, remember that shifting landscapes are the stuff of dreams and fantasies, as are the unseen things that set you on fire or dump water on your head. You elected to go to a magic place, so don't blame the game if the magic is sometimes more than you can take.

Although Transylvania may not be the most sophisticated of today's graphics adventures, it is a good one. And, in large measure, the original version of Transylvania pointed the way for those that followed.

This package is definitely worth a second look by older adventurers and is a good entry-level game for novices. *(Penguin Software, 830 Fourth Ave., Geneva, IL 60134. C-64/$34.95 disk.)*

Ervin Bobo
St. Peters, MO

At Bat Stats 64 B

Organize Your Baseball And Softball Records With This Simple Program

At Bat Stats 64 enables C-64 owners to keep track of the records and offensive statistics of baseball and softball teams and players.

This program should prove particularly useful to managers and coaches

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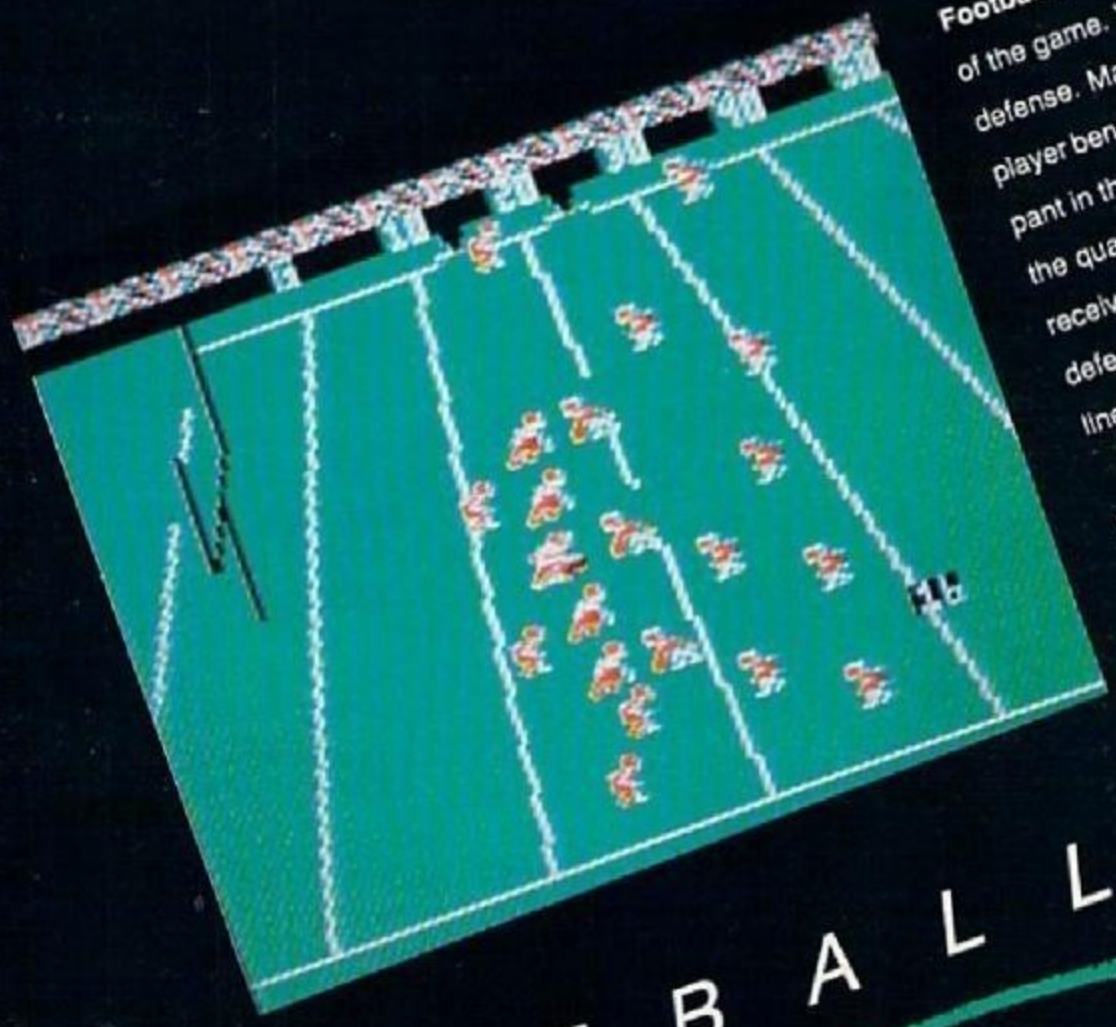

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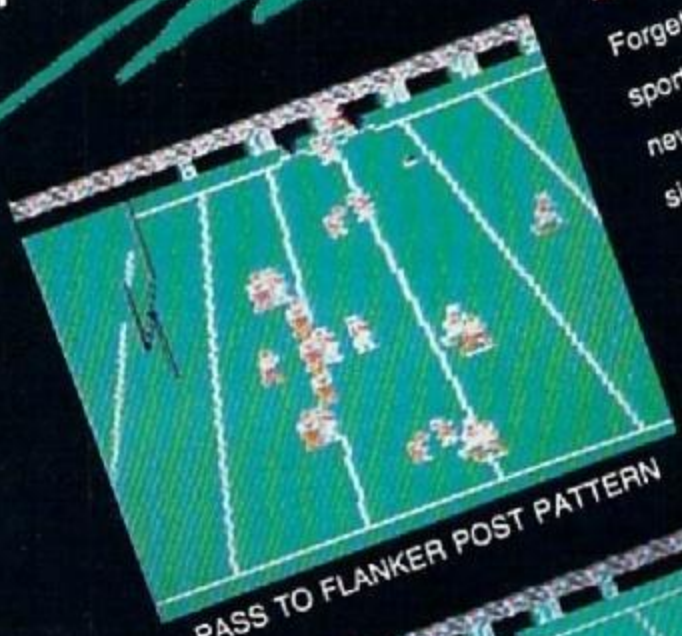

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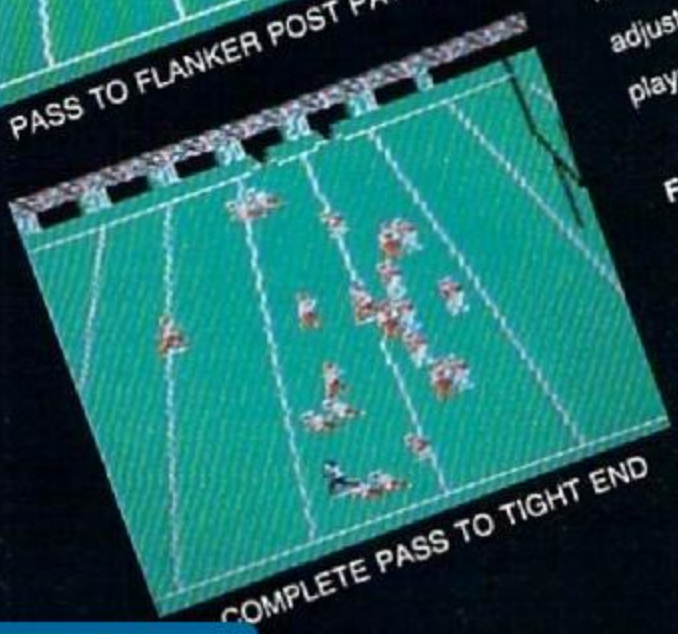

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of amateur softball, Little League and scholastic baseball teams. Fanatical followers of major league baseball may also use it to keep a record of their favorite players.

At Bat Stats 64 lets you record and print results of up to 162 games; maintain and update a 40-player roster; record, update and print complete offensive statistics for every player on the roster; maintain and print team schedules; and print or review individual game summaries and details.

The program, written in Basic and assembly language, takes care of computing the results and statistics, and it is a very easy program to use. One reason is that each screen contains a Coach's Box, which tells you the options that are available to you and what the various function keys will do; it also provides special instructions or messages.

Virtually every function operates in a similar manner. Once you learn the operation of the first screen, all the others make sense. And the first screen is easy to learn, thanks to a very decent instruction manual and the program's menu-driven operation.

The program is divided into two parts. One is for maintaining and updating statistical information. The other is for reviewing and printing out various reports that you can generate from that information.

One complaint I have about At Bat Stats 64 is that you cannot freely move from one part of the program to the other. Although both parts interface with the same data disk, you can perform only one operation at a time and must reboot the program to go on to another operation.

Another quirk is that the program does not provide for maintaining pitching records. This would limit At Bat Stats 64's usefulness for many baseball managers.

At Bat Stats 64 will not accept entry of more than nine runs scored per game for any one player. It's not likely, but it *is* possible that an individual could score ten or more runs in a game. It's also possible for a player to go to bat ten or more times in a game, yet that data-entry field is also limited to single digits.

There are other quirks that make data-entry somewhat awkward. In order to enter player statistics or game results, you must first delete the zeros that are programmed into every field. And in order to make changes to just one field, you must move the cursor through every other field on the screen.

Most of these limitations are more annoyances than real problems, but the more serious flaws, such as the program's inability to track pitching performances, may be too important for some potential users to ignore.

On the positive side, the program's graphics, such as the charts and tables, are wonderful. Equally pleasing are the printouts that you can generate with this program. They come in tabular form and are very easy to read. They should work well with many printers, judging by the various options provided by the program.

Another nice feature is that, when you enter individual player statistics,

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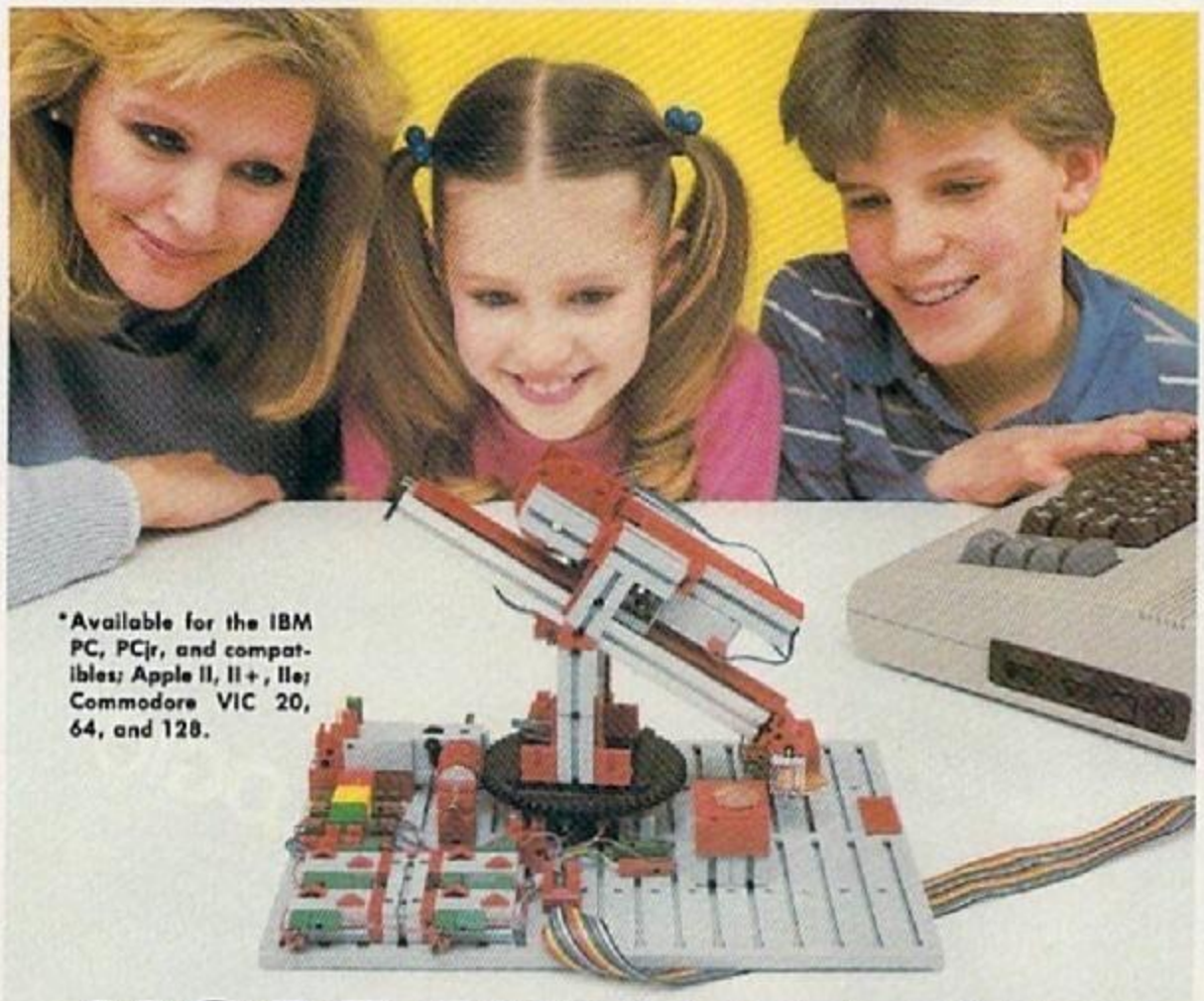

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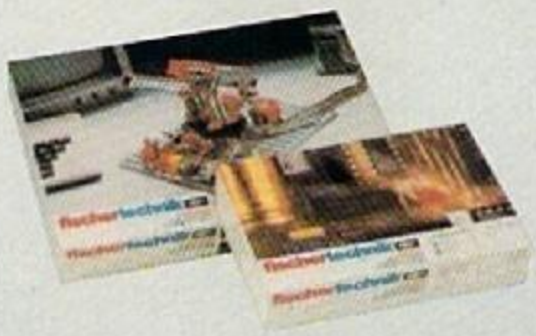

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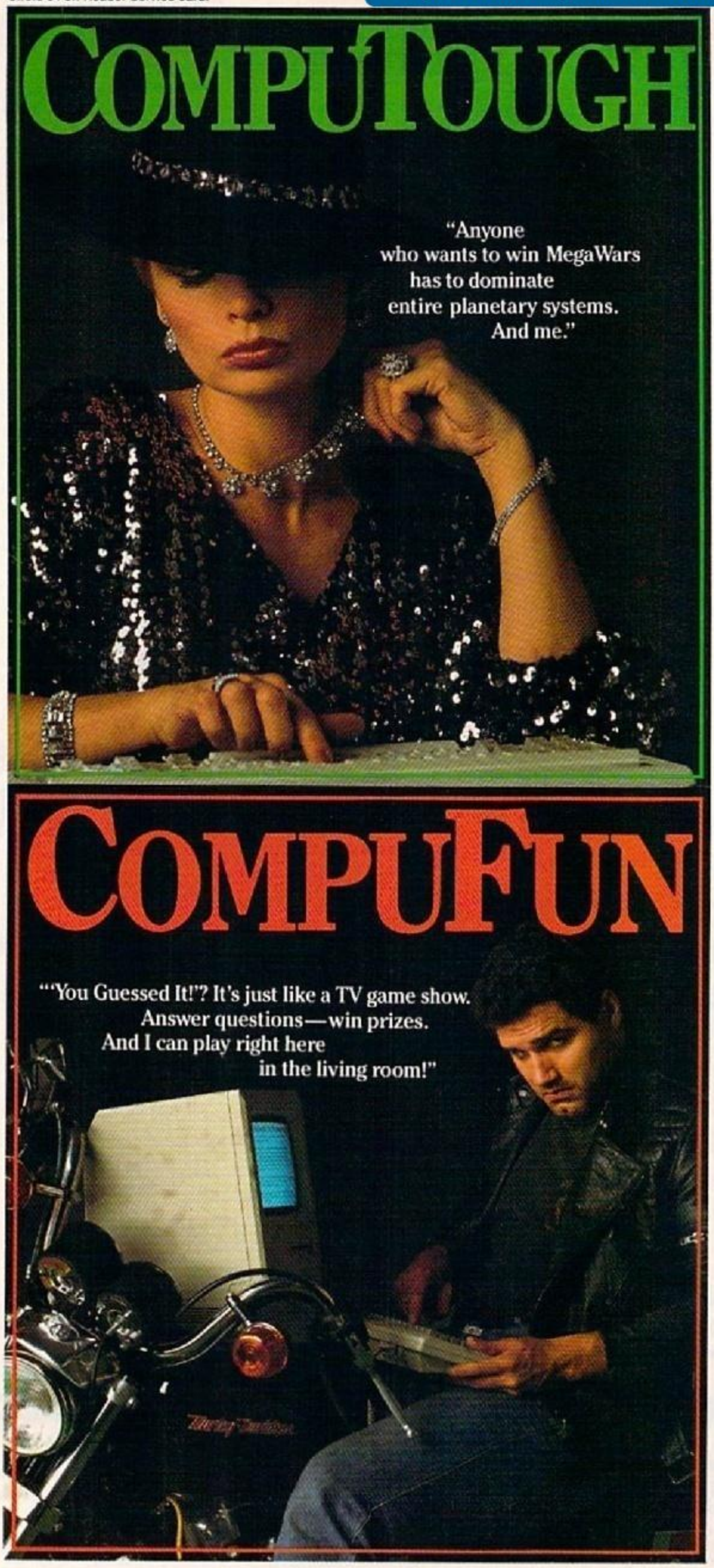

the program prevents you from making certain mathematical mistakes. If, for example, the number of hits or runs awarded to individuals does not equal the total number awarded the team, the program will notify you of the imbalance.

But probably the nicest thing about At Bat Stats 64 is that it does what the folks at 43rd Street Software say it will do. And, providing you can live with its flaws, it will do it well for you. *(The 43rd Street Software Shop, 720 43rd St., Ashland, KY 41101. C-64/ $22.95 disk.)*

Scott Wasser
Wilkes-Barre, PA

Pipeline

B

Here's a Puzzling Plumbing Problem for Your Child to Solve

Pipeline is a clever program for children aged eight and up, but adults may enjoy it, too. Presented as part of the Thinking Strategy Series, from Learning Technologies, this game challenges you to solve problems.

The beauty of Pipeline lies in its apparent simplicity. Select one of three levels of play and watch the computer randomly sprinkle as many as seven objects across the screen. You must select and install various pieces of pipe to carry water from the main faucet to all of the objects.

You can rearrange the plumbing installation any number of times. But be forewarned: When you hit the return key to start the water flowing, mistakes will practically squirt you in the eye.

Finding the solution to this plumbing problem is not an easy task. To make things even more difficult, a master plumber can set the game's timer to turn on the water after a preselected time period and then see how much of the job he can complete before the valve is opened.

There is a certain amount of suspense in watching the blue water flow slowly through the system. Open pipes leak, while properly connected

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devices squirt, gurgle and spurt. Objects that have not been properly hooked up are crossed off the screen with huge Xs.

The educational goals of this game are to provide practice in problem-solving techniques. It offers experience in analyzing problems, experimenting and using rules and models—and it's a lot of fun to play.

Despite being an engrossing educational exercise, Pipeline does have one annoying flaw. If you cannot find the solution to a particular problem, you're out of luck. Although Pipeline presents problems, assesses your work and demonstrates success and failure, the program neither shows how to correct mistakes nor offers a second chance.

Though it's designed for kids eight and older, Pipeline can also be enjoyed by little squirts—if they can get their parents to quit playing it. *(Learning Technologies, 4255 LBJ Freeway, Suite 131, Dallas, TX 75244. C-64/ $19.95 disk.)*

John Premack
Lexington, MA

Programmers' Basic Toolkit

B

Boost Your C-64's Power With More Than 100 New Basic Commands

If you've ever tried to write your own programs using the Commodore 64's built-in Basic 2.0, you know how difficult it can be to access many of the machine's outstanding graphics and sound capabilities.

While Programmers' Basic Toolkit doesn't make programming a breeze for a complete novice, it does provide the advanced programmer with more than 100 new commands that allow you to control sound and graphics with assembly language power and speed. In addition, the package includes a pair of excellent utility programs—a background/font editor and a sprite editor. Both are joystick-controlled and feature convenient pull-down menus.

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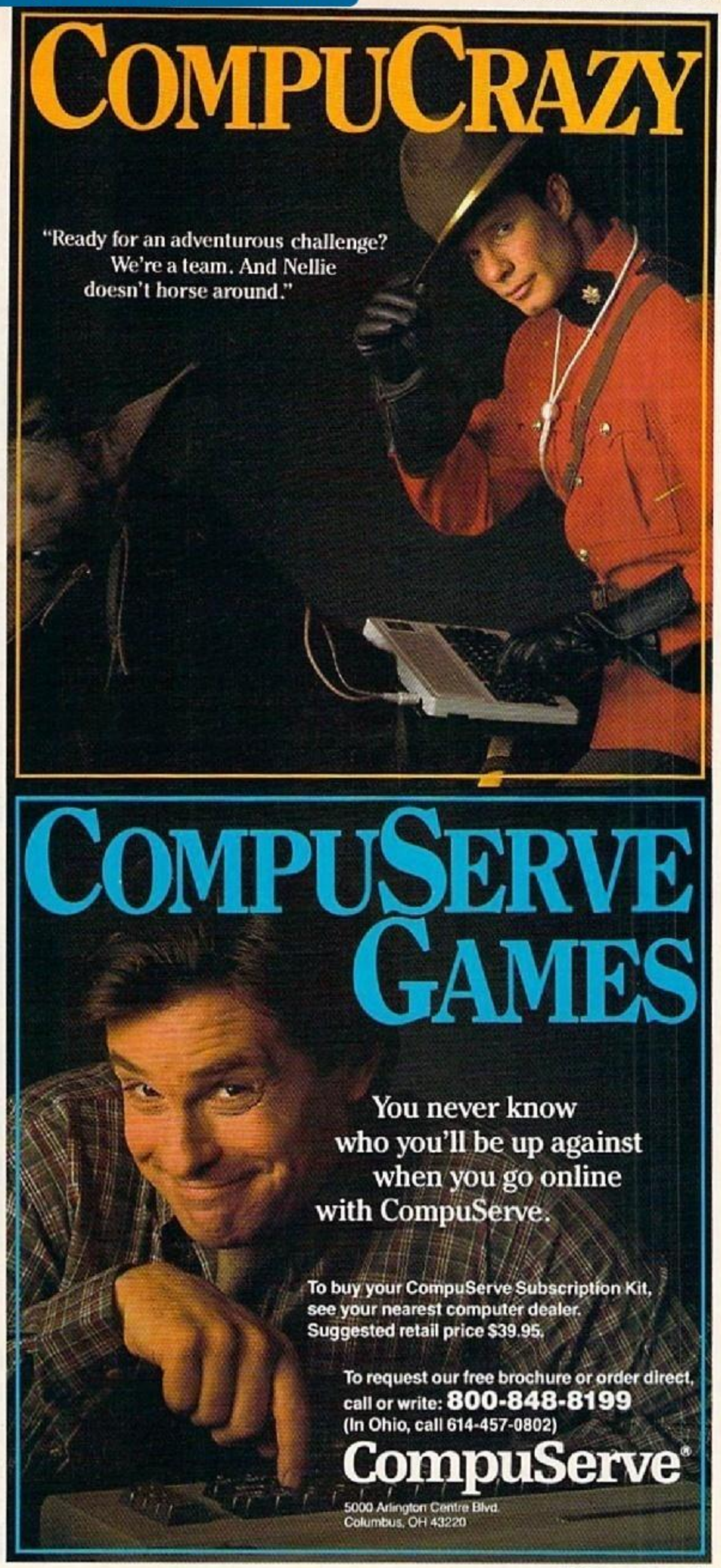
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Like the C-128's version of Basic, this program's Basic uses many descriptive keywords that help take the mystery out of programming. For example, to change a border color to red with your C-64, you'd normally type POKE 53280,2. With Programmers' Basic Toolkit, you can simply enter BORDER RED. Not only do

Some of the other commands that make this package a valuable programming aid include Change/To, which finds every occurrence of a specified string and replaces it with a new string of your choice; the Procedure and Do commands, which allow you to define a subroutine that you want executed repeatedly and then to call it up by name from anywhere in the program without having to use Gosub/Return; an On Error Goto command that makes a program jump to a specific line number whenever an error occurs; and REN, which lets you assign new numbers to your program lines. REN also allows you to specify the starting line number and the increment between line numbers, and it automatically adjusts all references to line numbers within your program.

This program's real strength, however, lies in the many specialized graphics commands that let you easily create, save, load and manipulate high-resolution, multicolor and text screens, as well as custom character sets and sprites to use with them.

Although all utilities and commands are well-documented in the user's guide, the quick-reference guide and the numerous help screens that accompany the program, it's assumed that you already know how to program in standard C-64 Basic. So,

If, however, you already have a good handle on Commodore Basic and feel you're ready for a little more power and flexibility, then Programmers' Basic Toolkit may be just what you need to unleash your programming potential. *(Epyx, 1043 Kiel Court, Sunnyvale, CA 94089. C-64/$34.95; C-128/$44.95 disk.)*

Bob Guerra
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comer to the fantasy role-playing genre, Ultima IV will amaze you with its vastness and variety of features.

Occupying both sides of two disks, Ultima IV is a mystical quest through the countryside, towns and underworld of Brittania in search of the Eight Virtues of the Avatar.

Throughout your journey, you'll encounter countless enemies who'll try to keep you from your goal. Fortunately, there are also several characters who may provide clues to assist you or even join your crusade if they share your philosophy. To reach your goal, you must learn to harness the magic powers of nature and the mysterious forces of the wind and the twin moons, Trammel and Felucca.

Ultima IV is quite different from many role-playing games. The program begins by taking you on a short graphics adventure that leads you to a renaissance fair and the wagon of a gypsy woman. The woman reads your future by asking you questions that measure your capacity for certain virtues. You are then given the profession of Fighter, Bard, Paladin, Mage, or one of four others, and assigned values for magical strength, dexterity and intelligence.

Although Ultima IV is basically a one-player game, you don't have to venture forth alone. By talking to some of the people you'll meet in the towns, you may be able to recruit some spirited and able-bodied traveling companions.

In addition to such common foes as bats, dragons, orcs, rats, trolls, spiders and slime, Ultima IV also attacks you with floating eyes called Gazers, Lava Lizards, deadly Mimics that can assume any shape, and squids, sea horses and pirates to plague you at sea.

Every animated opponent has its own method of wreaking havoc on your party and you quickly must learn the best way to oppose each enemy. From the weapons shops, you can obtain several kinds of armaments, including swords, daggers, maces and crossbows.

Some situations may call for casting spells to ward off enemies, remove evil spells or bring unfortunate fellow travelers back to life. Before you can cast a spell, you must acquire the necessary reagents, such as spider silk and blood moss, and mix them in the proper proportions. You'll be able to conjure up energy fields, ice balls and magic missiles to hurl at your foes, along with a number of spells that will help you maneuver around Brittania.

The land is a complex mixture of several kinds of terrain and waterways. You may travel by foot, horse or ship and, if the phases of the twin moons allow, teleport around Brittania through magic glowing portals.

Included in the package are a history of Brittania, a book of magic wisdom, a cloth map and an ahnk for good luck.

After exploring Brittania for a while, you'll probably conclude that Ultima IV may be the best game of this kind ever created. You may also realize you could use another good luck piece. *(Origin Systems, 340 Harvey Road, Manchester, NH 03103. C-64/$64 disk.)*

Bob Guerra
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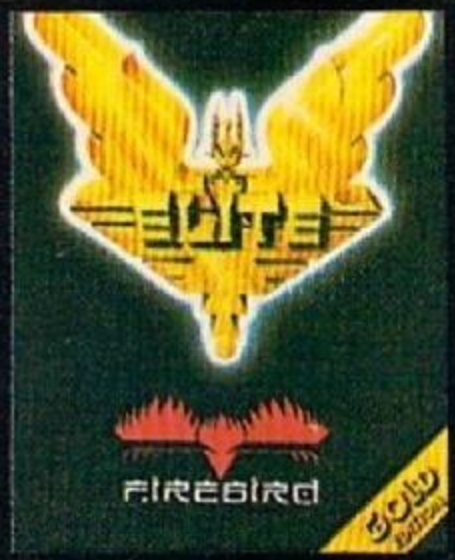

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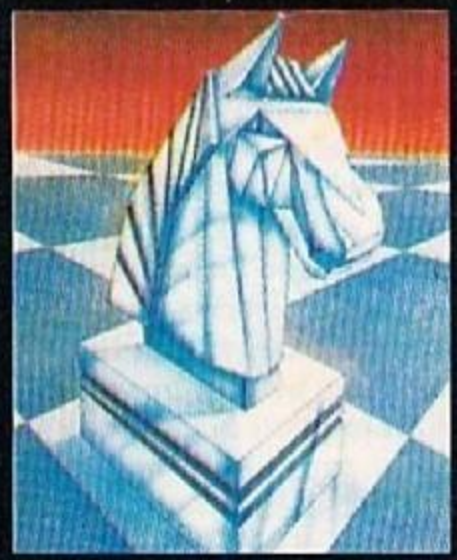

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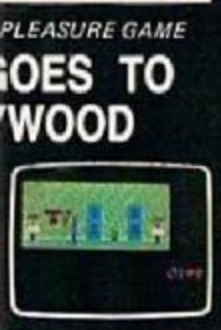

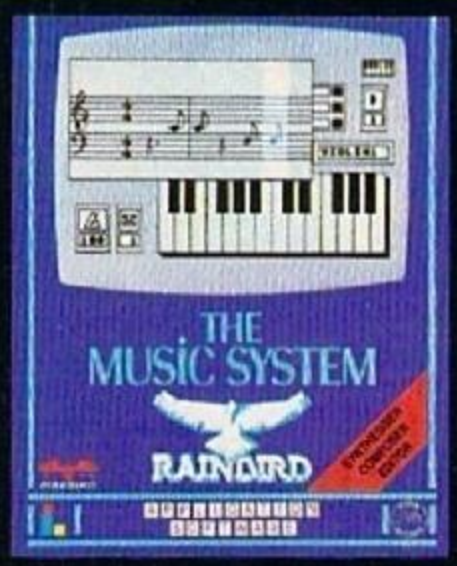

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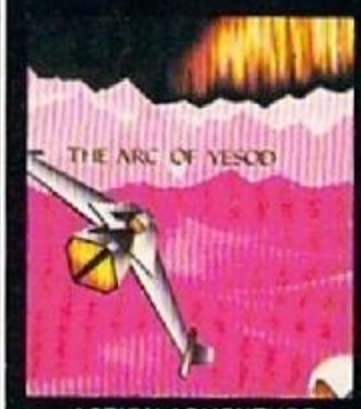

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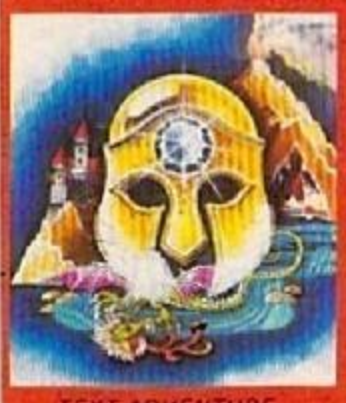

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GEOS: "A WHOLE NEW WORLD FOR YOUR COMMODORE"

Remember when the C-64 was considered a computer with limited capabilities? Well, GEOS, the new operating system from Berkeley Softworks, has changed that impression by tapping the hidden potential of the C-64, unleashing a powerful computer with features that rival those of much higher-priced micros.

By MATTHEW STERN

GEOS stands for Graphic Environment Operating System, a new bit-mapped operating system from Berkeley Softworks that opens up a new world for Commodore 64 and 128 owners. It brings new possibilities to the Commodore realm by giving the computer an easy-to-use operating system of icons, pull-down menus, windows and dialogue boxes, just like the Apple Macintosh, Commodore Amiga and Atari 520ST.

GEOS not only lets you easily combine text and graphics in your word processing documents, but also speeds up your disk drive five to seven times and uses it to increase the C-64's available memory.

All these enhancements are achieved by software. GEOS comes on a single disk that contains the operating system, deskTop, desk accessories and two applications: geoPaint, a graphics designer and editor, and geoWrite, a word processor. Its operation requires a joystick or a mouse, such as Commodore's 1350.

We reviewed GEOS using the 1350 mouse, which has two buttons. (GEOS, however, employs only the left button.) Although the mouse puts the C-64 on a par with some more expensive computers, the joystick is actually more responsive. Even at the mouse's greatest acceleration, the initial movement tends to be slow. (However, Commodore has plans to release a lower-cost, one-button mouse that promises a speed increase.)

What GEOS Does

The first thing that appears after you load the GEOS operating system is the deskTop user interface, which you use to handle files. As on the Macintosh, Amiga and 520ST, disks and files are represented as icons. All the

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files are displayed right in front of you on a disk notepad, with different types of files represented by different icons. You can perform all functions either by activating an icon or by selecting a menu item.

Instead of typing in a long command, as C-64 users currently do, you just move the pointer (with mouse or joystick) to the desired menu on the command bar across the top of the screen and press the button once (called clicking). This brings down a menu of related commands, from which you select the one you want.

You can also use icons to perform operations. For example, to delete a file, drag its icon over to the trash can; to run an application, move the pointer to the icon and press the mouse button twice (called double-clicking). Those of you who are new to this type of user interface should get a special kick out of this aspect of the system.

DeskTop not only makes using the GEOS operating system easier and more fun; it adds several features usually found only on more powerful computers. For example, if you wonder when you made the last revision on a file or what type of application it belongs to, click on its icon and select the Get Info from the File menu. You'll get all information about the file, including its type and the date and time you last revised it.

Additional features let you enter a two- or three-line description and write-protect the file by clicking on a box. Commands in the View menu can display information for all the files on the disk's notepad, according to name, date of last revision, size and type.

GEOS also achieves something never done before by using the 1541 or 1571 disk drive as a virtual memory device. This means that when GEOS runs out of room in

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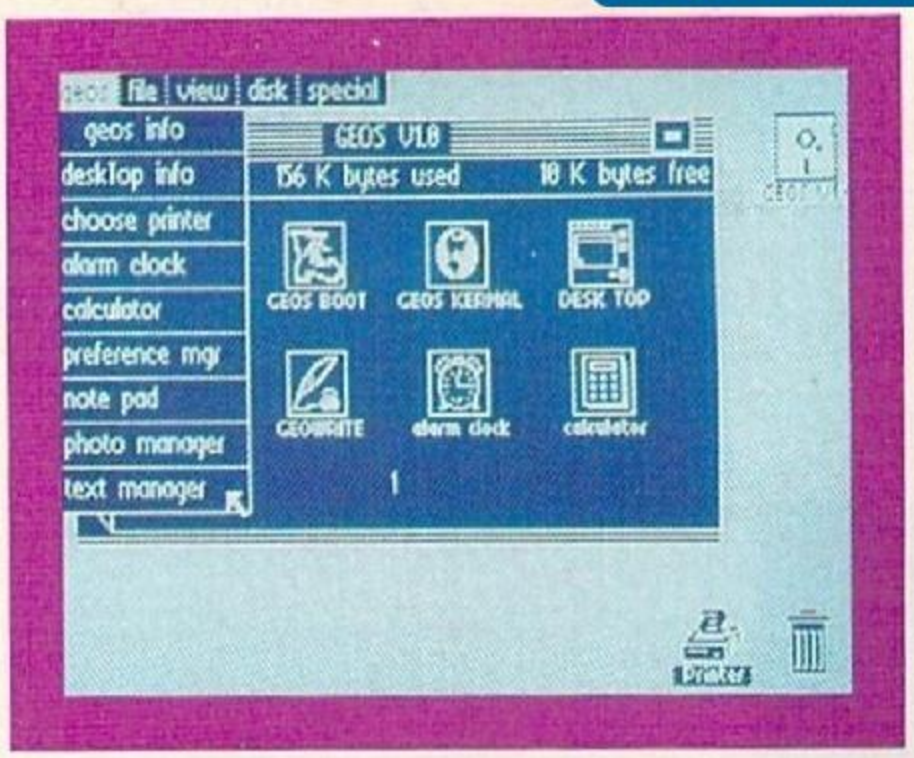

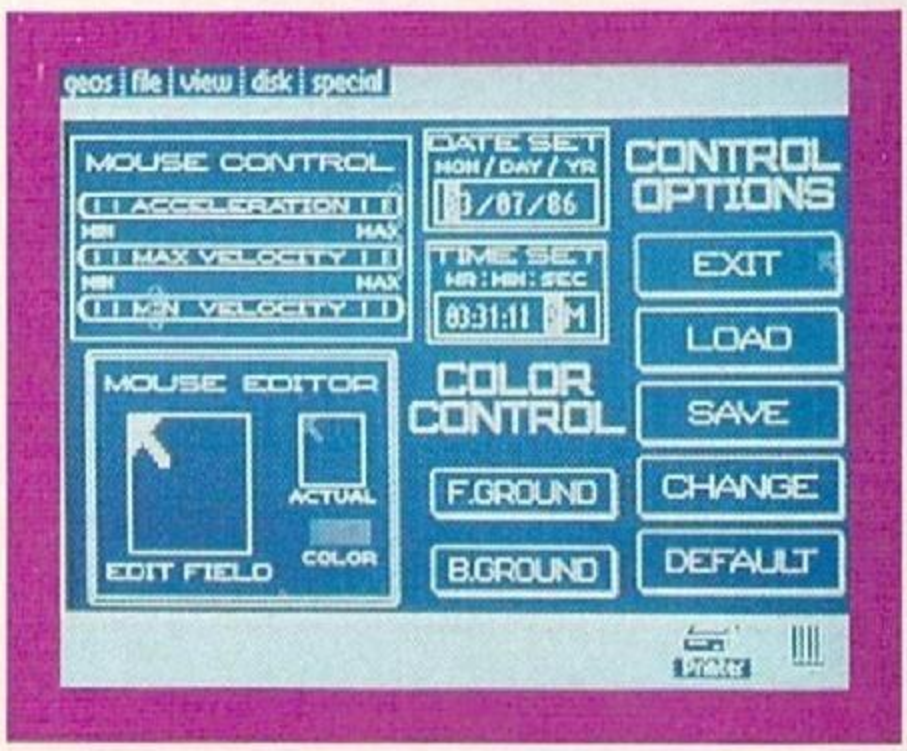

the computer, it saves the extra data to the disk drive. GEOS, desk accessories and applications can thus all run at the same time and still allow more than enough room for your documents. Moreover, since GEOS speeds up the drive five to seven times the normal speed, there is hardly any waiting. Unlike the fast-loader programs, which speed up only the loading process, any GEOS application will continue to operate at the higher speed.

GEOS Works Together

GEOS, its disk accessories and the applications geoPaint and geoWrite are all designed to work together. The operating system resides in memory at all times and does not conflict with the program you are using.

Version 1.0 of GEOS comes with a preference manager, alarm clock, note pad, calculator and photo and text albums. The preference manager lets you change the time, date, mouse speed and even the pointer's design and color. You can also change GEOS's foreground and background colors to whatever combination you please.

The alarm clock and calculator are self-explanatory. The notepad, however, is probably a new feature for many C-64 users. Actually a place for storing short memos that you can recall at any time, it holds up to 127 pages, with 250 characters per page.

The photo and text albums are handy features that allow you to cut excerpts from geoWrite files and sections from geoPaint pictures, store them on disk and later paste them into new geoWrite files. This is essentially an electronic scrapbook—a feature that will be appreciated by newsletter editors and designers (much like the Clipboard features of the Mac that let you use data, text and graphics from one application with another).

Data and desk accessories are not the only things that GEOS applications can share; they also use the same text fonts, printer drivers and disk enhancements.

Running non-GEOS Programs and Using Two Drives

GEOS is flexible in that you can run non-GEOS programs if you wish. Basic programs and many machine language programs can be booted from within the deskTop program. You just open your non-GEOS disk from the disk menu and double-click the icon of the program you want to use. Most non-GEOS programs will autoload and autorun. Berkeley did a good job on this.

You will find there are some machine language and copy-protected programs that will not autoload and run within GEOS. Also, once you've booted out of GEOS, you cannot, of course, use the system's fast loader or enhanced DOS.

When you want to get back into GEOS, you just break the program, insert the GEOS disk and press the restore key. GEOS will automatically reboot.

The system lends itself well to a two-drive setup. When running a non-GEOS program, you can just place its disk into your second drive and keep GEOS in the first. This removes the chore of disk-swapping and makes file-handling much easier.

Two drives are also a distinct advantage when you're using backup disks. You're encouraged to make copies of your GEOS disk and then tailor them to your favorite applications by deleting non-essential files, thus making room for your application files. A two-drive setup easily lets you use your boot disk and an application backup disk without swapping.

GeoPaint

GeoPaint looks and works a lot like the Apple Macintosh's MacPaint, except that it offers the entire line of the 16 Commodore colors. It gives you a selection of 14 different drawing tools, which appear as icons on the left of the screen. Down one side of the screen is a large drawing window, showing a section of the 8½- by 11-inch page you can use for your illustration.

To move around the page, you use the scrolling-arrows icon, which appears as four arrows in the upper-left corner of the drawing menu. At the top of the screen is the command bar, with functions for program options and text fonts, as well as for saving and closing files. GeoPaint lets you use the full library of fonts with your graphics.

For free-hand drawing, just click on the pencil-head icon and sketch on the drawing window. The pointer turns into a little pencil as you move it to the window, and it also changes color to indicate different uses (which the Macintosh cannot do!). It turns yellow when you're just moving it, black when you're drawing and red when you're erasing.

Using the mouse, a more natural drawing tool than a joystick or trackball, it's easy to create professional-quality graphics with geoPaint. Since all the functions are on the

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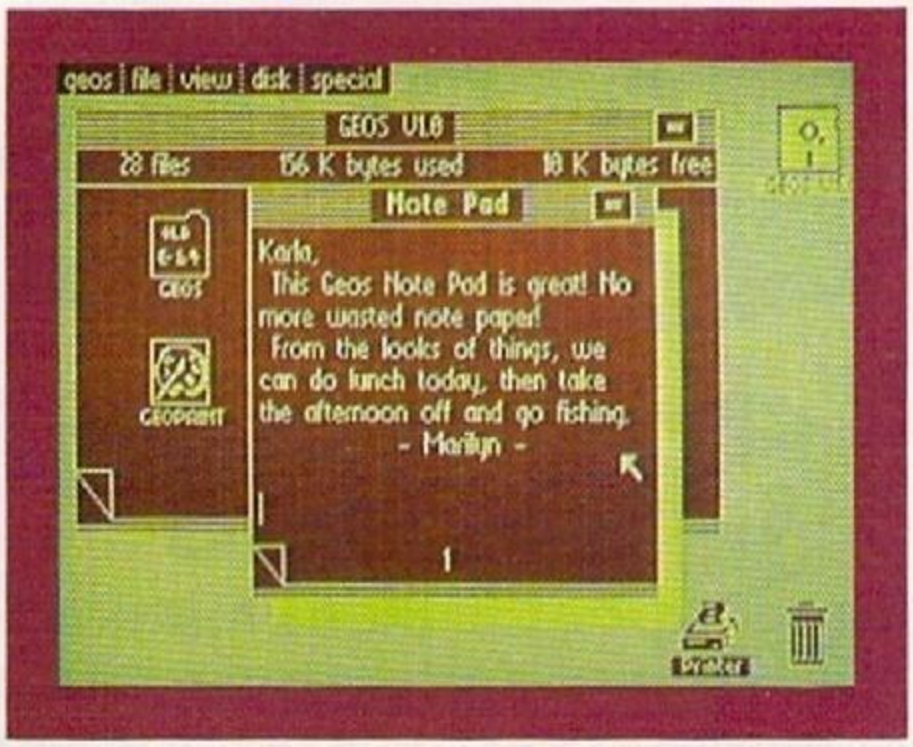
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156 K bytes used
10 K bytes free
Note Pad
GEOS
GEOPAINT
Karla,
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From the looks of things, we can do lunch today, then take the afternoon off and go fishing.
- Marilyn -
1

screen, you don't need to flip back and forth from the drawing screen to the menu to select a function.

Editing is also very easy. You draw a box around the graphic you want to copy or move and click where you want it placed; or you can cut or copy it into the photo album for later pasting into another geoPaint picture or geoWrite document. Graphics can also be rotated, inverted (shown in reverse video) or flipped over.

A handy pixel-edit mode lets you put in fine detail by enlarging a portion of your picture so you can see each pixel. If you make a mistake, just click the Undo icon to erase your last change, or select the Recover from Disk command in the Options menu to bring up the last-saved version of your file.

The geoPaint 1.0 version that we reviewed did not support full-color graphics. Instead, you have a choice of 32 shading patterns. Berkeley Softworks said it chose black-and-white (over full color) for its readability, especially on television sets, and so that you can see your artwork the way it will actually be printed on your black-and-white printer.

The final release *does* use color and supports color printers, such as the Epson JX80, Okimate 10, the Apple ImageWriter II and laser printers such as the Hewlett-Packard.

GeoWrite

If you are used to word processors with complicated editing commands, geoWrite will give you a pleasant surprise. Its commands are so easy to use that you'll be able to master it in minutes. To delete a range of text, just highlight it by dragging the mouse over it, holding down the button as you do so, and then press the INST/DEL key. If you want to change text, highlight it and type in the correction. The new words will replace the old.

Change a margin? Just go to the ruler at the top of the window, click on the M and move it where you want it to go. The document will reformat automatically. Since GEOS uses a 40-column screen, you'll see only two-thirds of your document's width at a time. The document scrolls across the screen as you type, and you can drag the pointer to any section you want to see.

With the variety of type styles and sizes available in GEOS, you can select a combination to achieve and print out a screen display ranging from 30 to 110 characters.

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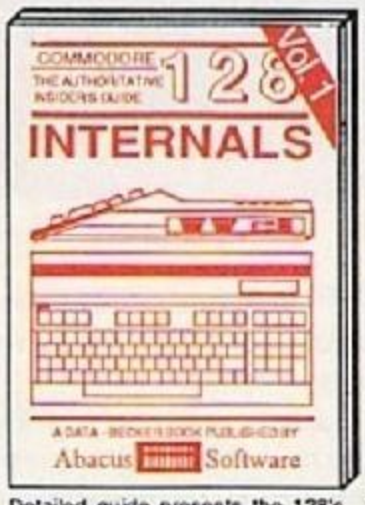

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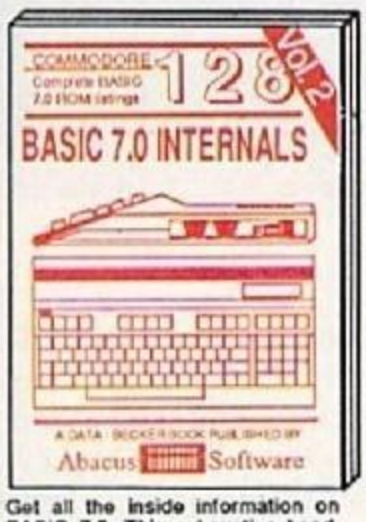

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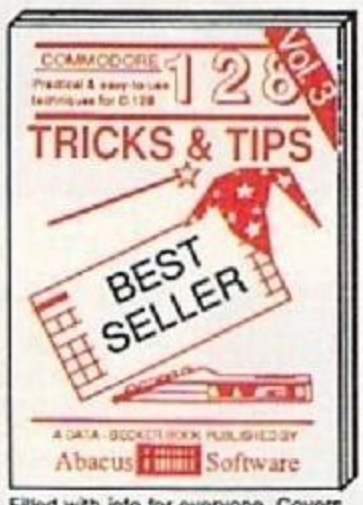

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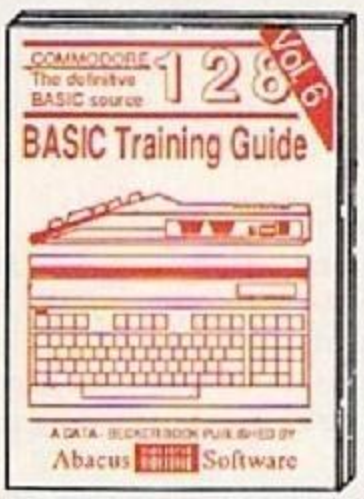

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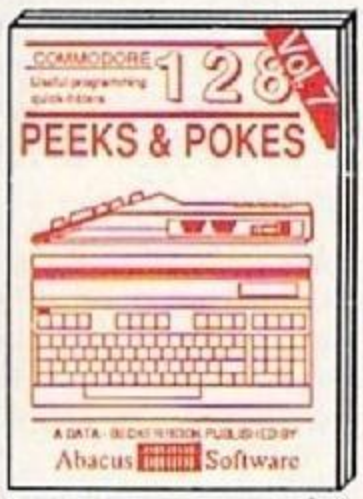

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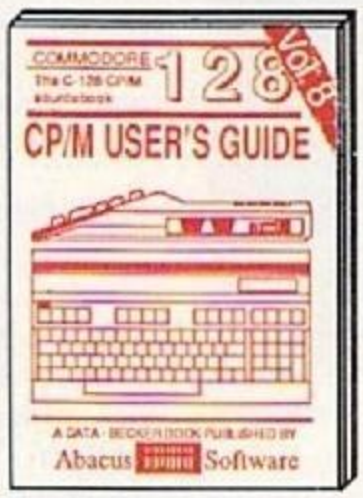

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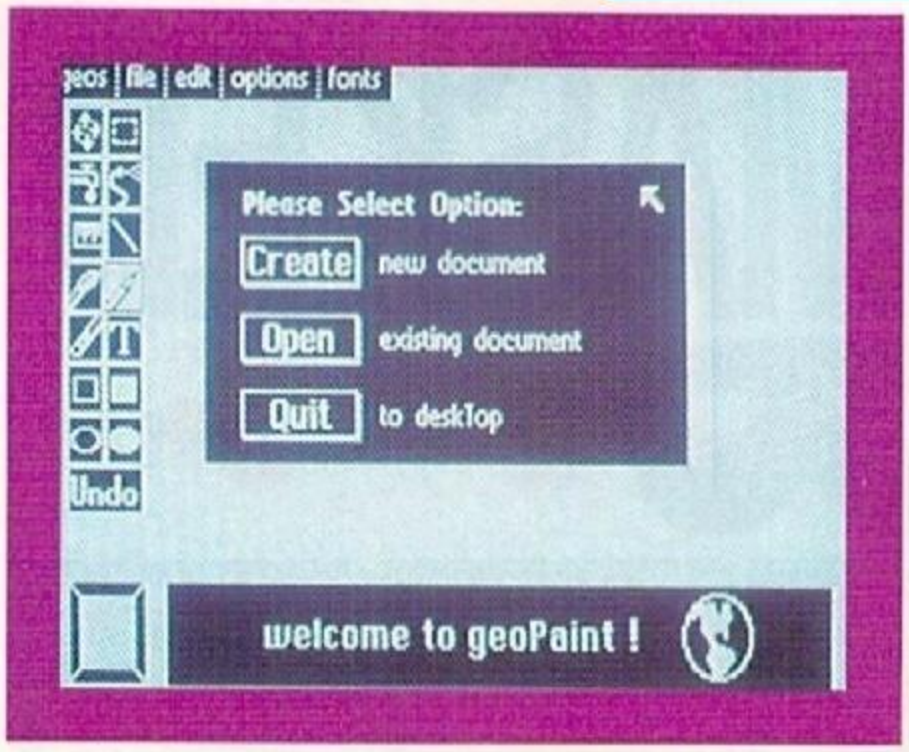
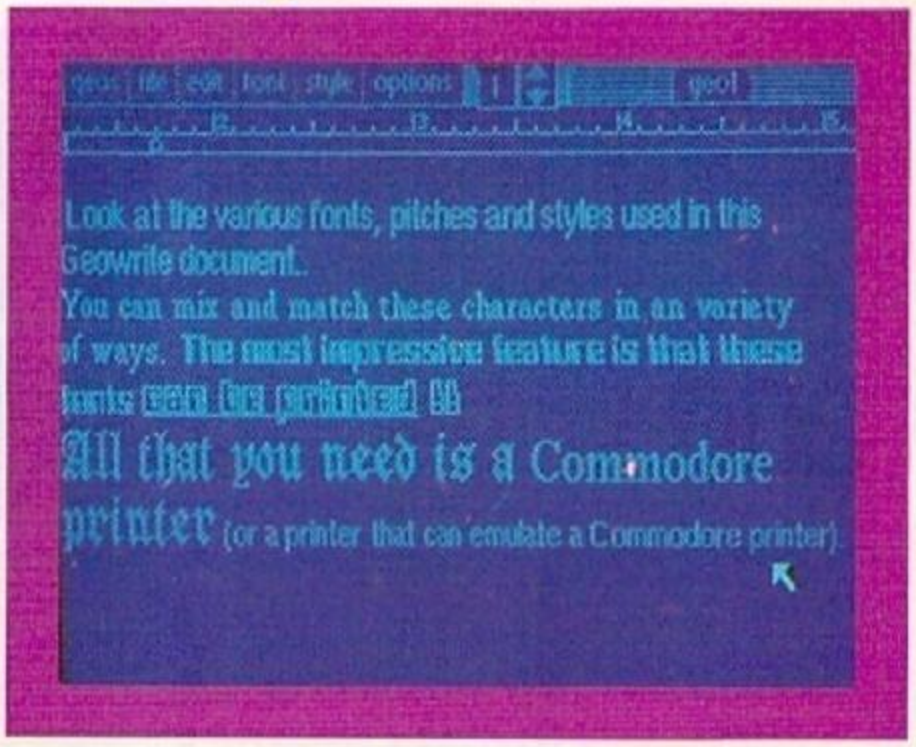
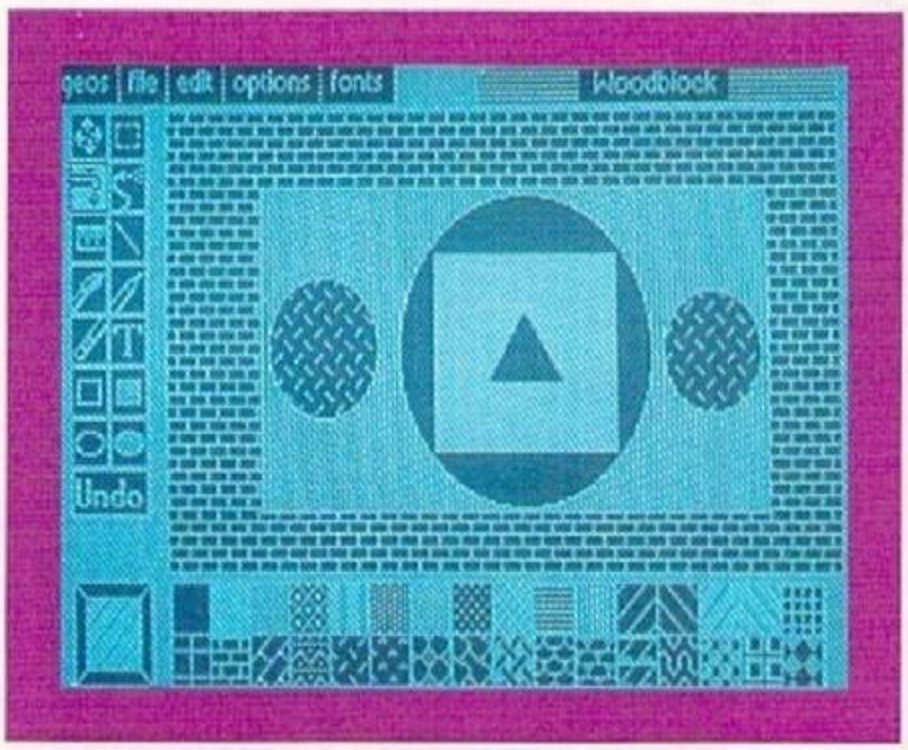



Look at the various fonts, pitches and styles used in this Geowrite document.
You can mix and match these characters in an variety of ways. The most impressive feature is that these fonts
All that you need is a Commodore printer (or a printer that can emulate a Commodore printer)



The multiple fonts, pitches and styles can be displayed simultaneously on the screen.

Equally impressive is geoWrite's selection of proportionally spaced fonts and typestyles. GEOS currently comes with six fonts in several different sizes, all displayable in regular, bold, italics, underline and outline typestyles. Think of the attractive newsletters and reports you can create with them, especially if you add geoPaint pictures!

GeoWrite takes advantage of GEOS's virtual memory, so your only limitation in document length is available disk space. With version 1.0, the GEOS system files, the fonts and the geoWrite application have to be on the same disk as your file. But this still gives you about 35–40K of free disk space for your documents—more than most C-64 word processors and enough for about 11 to 13 single-spaced, text-only pages. GeoWrite documents take more memory, of course, when you add graphics.

In spite of geoWrite's easy-to-use editing features, its spectacular fonts and the ability to create longer-than-average documents, it has some shortcomings that may disappoint you. Due to memory limitations, version 1.0 lacks the headers and footers, double and triple spacing, page numbering and search-and-replace functions you find in most word processors. Berkeley had to choose, and it decided that these were features of lower priority than others included in the current version.

GeoWrite also shares one bad feature with the Macintosh: You can't use the cursor keys to move your document around. Instead, you have to use the mouse to manipulate a small box icon or click on two arrows at the top of the screen.

Another complaint I have about geoWrite, which also applies to GEOS as a whole, is the lack of keyboard equivalents for popular commands. After using GEOS for a while, I got tired of reaching for the mouse every time I wanted to initiate a command.

The Future of GEOS

This version of GEOS is nonetheless impressive. Berkeley Softworks will send to all of its registered version 1.0 owners a free version of the final release, which should be available by the time you read this, as well as a package containing additional fonts for use in geoWrite and geoPaint.

Some of the changes planned for the final version are color graphics, as mentioned earlier, and changeable shading patterns for geoPaint, a trash can that will let you recover files thrown out by mistake, and cursor-key controls and a search-and-replace function for geoWrite. A C-128-mode version of GEOS is expected in the fall. If and when future enhanced versions are released, Berkeley Softworks will make them available to GEOS owners at a nominal charge.

Additional GEOS applications and desk accessories are under development by Berkeley Softworks and other manufacturers. If you're interested in developing programs that use GEOS, Berkeley Softworks will be releasing a programmer's reference guide in June or July. GEOS is available for $59.95 from Berkeley Softworks, 2150 Shattuck Ave., Berkeley, CA 94704; 415-644-0883 or 800-443-0100.

GEOS is not just another software program. It's a wholly new operating system that gives Commodore 64 and 128 users some important capabilities never before available. Moreover, it's fascinating and fun to use. R

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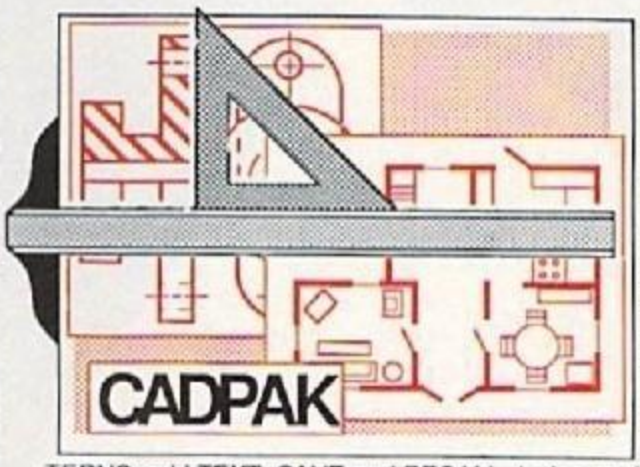

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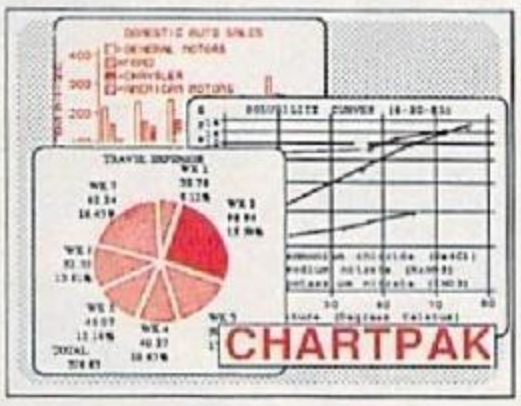

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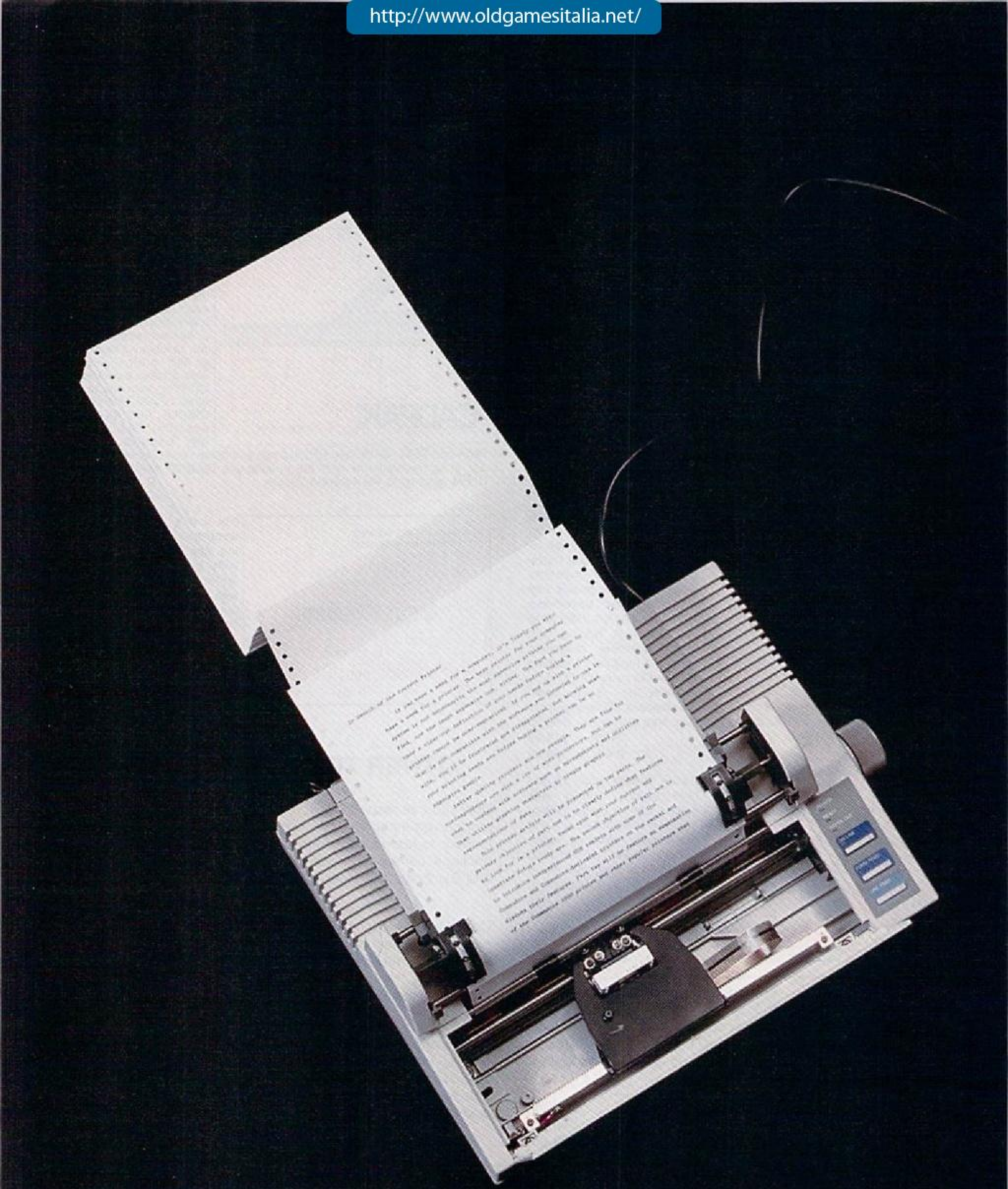

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IN SEARCH OF THE PERFECT PRINTER, PART II

Still haven't determined which printer is best for you? To help you decide, here's the conclusion of our look at popular printers for Commodore owners.

By TIM WALSH

What do most beginners look for when choosing a printer? Usually, a low price tag. After all, if the price is right, everything about the printer seems more tempting, and shortcomings in its features and design can be easily overlooked.

This article concentrates on some of the popular, low-priced printers that Commodore owners are likely to buy. With the exception of the Commodore MPS-1000, those discussed below were released a year or more ago. You can still find mail-order ads for the superb Panasonic KX-P1091 and bargain-basement Mannesmann Tally Spirit 80, but you probably haven't seen a recent review of either, since they've been on the market such a long time.

Commodore MPS-1000

We'll begin this examination with a look at the MPS-1000, Commodore's latest release, and surely the most discussed Commodore printer in recent memory.

Actually, the MPS-1000 is a modified Epson Homewriter 10, bearing the Commodore logo and a price tag of $299.95. It is best suited for home use or light office work, and is a good choice for either the beginner or experienced user. It possesses some interesting features that you won't find on any earlier Commodore printer.

However, its printing quality and ability fall a little short when compared to other low-end machines. Its print speed of 100 characters per second (cps) in Draft mode and 20 cps in Near Letter Quality (NLQ) mode are slower than some others in its price range. Also, while the NLQ print quality is good, you'll find better in some other dot-matrix printers of comparable cost. A further major shortcoming is the lack of an italic character set.

Despite its drawbacks, the MPS-1000 has features sufficiently appealing to lure many potential owners away from attractive third-party printers. It works well in day-to-day use, is relatively quiet and easy to use, and it works well with 1525 print routines.

The MPS-1000 is unusual in having both serial and parallel Centronics interface ports. The serial port can access two print modes—Commodore and IBM. The parallel port allows access only to the IBM mode, referred to in the MPS-1000's user's manual as the IBM 5152 Plus mode.

The option of two print modes adds considerable flexibility to this machine. They give you the choice of two Commodore character sets—uppercase/graphics or upper/lowercase. Accessing the IBM mode also gives you two character sets, composed of IBM graphics, standard and international characters. Again, it's important to realize that both the Commodore and IBM modes can be accessed through the serial port, so there's no need to use the parallel port with Commodore equipment.

Although initially you may not think you need both the serial and parallel ports, both together give you three important benefits. First, the serial port lets you use the printer without a parallel interface. Second, the parallel port gives you the option of using the printer with non-Commodore computers. Third, using the parallel port with an interface having a print buffer of large capacity frees up the computer during printing operations.

In Commodore mode, the MPS-1000 is limited in its print features. There is only one print pitch, pica, which prints ten characters per inch (cpi) and can be enlarged to double size, and Draft or NLQ are the two print modes.

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Print features accessible via control codes are: underlining, reverse print, programmable line spacing and both single- and double-density graphics.

Eleven secondary addresses in Commodore mode permit a printer reset, custom formatting of print and the activation or suppression of the printer's diagnostic messages. The user's manual, which is loaded with technical information for programmers, devotes an entire chapter to graphics in the Commodore mode and a second chapter to IBM-mode graphics.

Commodore's MPS-1000 printer.

The MPS-1000's IBM mode, selectable via one DIP switch when using the serial port, provides substantially more features than the Commodore mode, including three print pitches—pica (10 cpi), elite (12 cpi) and condensed (approximately 17 cpi)—all of which can be accessed in enlarged print via control codes. In IBM mode, you also have super- and subscript characters, an emphasized print mode and NLQ characters.

To help you begin programming graphics in either mode, the two graphics chapters in the manual contain several examples. You'll quickly notice the advantages of IBM mode, which offers two more density settings than the Commodore mode. Even so, most MPS-1000 users probably find it easier to use Commodore mode for their own graphics programs, since fewer commands are necessary.

If, in using Commodore software, you stay locked into Commodore mode and select Commodore 1525 when asked for your printer type, you'll be able to utilize all the C-128 and C-64 software available. Also, the MPS-1000 has no problems handling high- and low-resolution screen dumps.

Considering cost, is the MPS-1000 the best printer with which to complement your Commodore computer system? The answer depends on your needs. If you want superb NLQ print, look elsewhere; but this is far and away the best printer available for first-time Commodore users. It works with just about all the popular graphics, business and recreational software designed for Commodores, and it permits the growth of your programming abilities.

Seikosha SP-1000VC

This recently introduced high-quality printer from Hattori Seiko is a modified, Commodore-dedicated version of the Seikosha SP-1000A that is covered later in this article.

Since it's designed for Commodore, no parallel interface is needed; you simply connect it to your computer system with the helpfully long (42-inch) serial cable included.

The printer is relatively small (15½ inches wide, 4¾ inches tall and 11 inches deep) and so requires little desk space. It features a low-profile removable tractor unit that is a significant improvement over designs found in other low-end printers. This unit easily and quickly adjusts to permit the use of any tractor-feed labels or continuous forms up to 10 inches wide and three forms thick. Removal of the tractor unit activates a switch that enables the printer to accept single sheets from an adjustable single-form paper holder that you mount in place of the tractor unit.

The SP-1000VC provides an NLQ mode—a 24 × 18 matrix—which you activate by pressing a button on the printer's control panel. Text created in this mode has a very distinct, slightly uneven appearance that distinguishes it from characters produced by other dot-matrix printers.

The print speed of the unit is 100 cps in Draft mode with 10 cpi pica characters; in NLQ mode, it slows down to 20 cps. Print features include standard, reversed and italic character sets, with pica, elite (12 cpi), and condensed (17 cpi) print pitches available in all three sets.

Near-letter quality is available with pica and elite print pitches from within both italics and standard character sets. You use control codes to select ASCII, CBM mode and condensed print. Four DIP switches on the rear of the unit are used to specify page length, device-number setting, perforation-skipping and zero-slashing.

Super- and subscript characters are activated and deactivated through the use of control codes, as are underlining, double-strike character and graphics. However, this printer has a limited graphics capability. It offers only one density setting—the usual 480 horizontal dots per line. But Commodore users will be pleased to note that high- and low-resolution 1525 screen-dump programs work well on this printer.

Hattori Seiko's Seikosha SP-1000VC.

The SP-1000VC also possesses multiple-function on-line, form-feed and line-feed buttons. As on many other dot-matrix printers, these buttons can be used for a self test or hex dump when you initially turn on the printer.

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The SP-1000VC also incorporates user-defined left and right margin-setting controls into the form-feed and line-feed buttons.

Surprisingly, the SP-1000VC's user's manual seems to be written exclusively for beginners. It covers all of the printer's features and provides at least one short Basic program to demonstrate each function. While this is sufficient instruction for control codes and secondary addresses, the manual should have included more information on the Graphics mode. Once you advance beyond the beginner's level, you'll have to look elsewhere for more in-depth graphics programming information.

The unit is unobtrusively quiet in both Draft and NLQ modes. The nylon ribbon is housed in a large cassette and, judging by its hefty proportions, it undoubtedly has a long service life. Replacement ribbons have a suggested retail price of $9.

I give the SP-1000VC high marks in print quality, features and value. It shows a lot of work and determination by a concerned manufacturer to capture a portion of the home-printer market. Its overall quality and ease of use should serve to make this a very popular third-party printer among Commodore owners. Seikosha plans an aggressive marketing campaign that will put this printer in the major discount stores. The SP-1000VC has a suggested retail price of $270.

It is no accident that the two-year-old Panasonic KX-P1091 parallel printer is very popular among Commodore owners.

Seikosha SP-1000A

This printer is the parallel interface version of the SP-1000VC and shares most of its print and design features. However, as it is not a Commodore-dedicated printer, a Commodore-compatible parallel interface is required.

There are a number of other features that distinguish the SP-1000A from the SP-1000VC. First of all, it has eight more DIP switches, providing a variety of functions, one of which is to enable you to access characters from 11 languages.

The machine also has a standard 1.5K print buffer that allows storage of up to 95 user-defined characters. The user's manual provides more technical information than that of the SP-1000VC, and it does a superb job of explaining each step in creating user-defined characters, from turning on the DIP switches to placing the characters into the printer's RAM.

The manual includes a particularly nice four-page chart showing samples of text created by mixing every possible combination of print features. More importantly, the manual includes full explanations of which print features have priority over others.

The SP-1000A really shines when it comes to graphics ability. Six settings allow a broad range of graphics printing. In describing how to access these graphics, the manual uses Basic samples that don't require much modification. Commodore owners will appreciate this.

The Seikosha SP-1000A printer.

Finding the right combination of commands and DIP switch settings to perform screen dumps and other graphics might be confusing for beginners. While experimenting with different interfaces, I discovered that the SP-1000A is Epson-code compatible and requires considerable programming experience to program.

I recommend this printer to advanced Commodore computerists who might be hindered by the SP-1000VC's limitations as a Commodore-dedicated printer. If you enjoy designing or modifying software and need a reliable printer, the SP-1000A is well worth your consideration. It has a suggested retail price of $299.

Panasonic KX-P1091

It is no accident that the two-year-old Panasonic KX-P1091 parallel printer is very popular among Commodore owners and is still the most popular printer in Panasonic's line. Although it prints NLQ characters only in 10 cpi pica pitch, the characters, with a matrix density of 18 × 18 dots, are among the best quality you'll find in low-end dot-matrix printers.

The KX-P1091, commonly referred to as the 1091, requires, of course, a parallel interface to work with Commodore computers. At 14.5 lbs. and 16 × 11.5 × 4.5 inches, the 1091 boasts an overall quality of construction that suggests long-term mechanical reliability. It has the usual control-panel buttons for on-line, form-feed and line-feed control, and it also contains a handy switch to toggle between draft, NLQ and compressed characters.

The 1091 features a small but long-lasting cassette ribbon that has an expected life of approximately three million characters. When the print begins to fade, the ribbon is adjustable with a pen or other pointed object. As an added benefit, the cassette ribbon is available in a variety of colors, including brown and blue, as well as the standard black.

With a 120 cps printing speed in Draft mode and a speed of 29 cps in NLQ, the 1091 is faster than much of its competition. It has a 1K print buffer (4K buffer optional) and offers italic, emphasized and expanded type, as well as underlining. You can also create superscripts and subscripts via control codes.

The 1091 has three printing modes that Commodore users can access with control codes or DIP switches. The first is Standard mode, which includes all 96 standard characters. The second is IBM PC Matrix Printer mode,

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Panasonic's KX-P1091 printer.

similar to the IBM Character mode offered by Commodore's MPS-1000. The third is IBM Graphics Printer mode, again similar to the MPS-1000's second IBM mode.

The 1091 has very impressive graphics capabilities. It offers seven graphics-density settings, ranging from single-density graphics of 480 up to 1920 dots per row. A wide selection of line spacing commands is available with individual control-code line spacing of 1/8, 7/72 and 1/6 inches. All three print modes provide line spacing in 1/72 and 1/216 increments. Control codes are also used to specify form length in either inches or lines.

The printer's standard 1K buffer is capable of accepting up to 40 downloadable characters. The manual only briefly describes how to perform the character creation, downloading and printing procedure, so beginners are likely to encounter problems.

Enough commercial software is available with print routines for Panasonic printers to give you a wide selection from which to choose. If you want to learn the art of fine-tuning your interface and printer to work with graphics, the 1091 is a good choice.

This is a fine printer and I strongly recommend it for those in need of a fast, low-priced, high-quality printer and for those compulsive programmers who do a lot of printer programming. Because of its many features and unique command format, the 1091 is a challenging printer to use, and, with its suggested retail price of $399, I recommend it to anyone looking for a good dot-matrix printer.

Okidata Microline 182

The Okidata Microline 182 has been around almost two years and has developed a small following of Commodore enthusiasts. It is basically an above-average printer, most of whose features, such as the three print pitches (10, 12 and 17.1 cpi) and emphasized and enhanced print, can be found on just about every dot-matrix printer in its price range.

However, the overall quality of the unit sets the Microline 182 apart from many other printers in the low-end market. It has the quality of workmanship, evident in both operation and appearance, that promises a lengthy lifespan. The printing in Draft mode, at 120 cps, is smooth, quiet and fast. Okidata has a repair contract with Xerox service centers to fix Okidata printers, should any problems develop.

Since this is a parallel printer, you need a parallel interface to use it with your Commodore. Until recently, the Microline 182 lacked an NLQ feature, so the use of an interface that gives you NLQ characters is desirable. Also, like many other non-Commodore-dedicated printers reviewed in this article, the print commands provided in the manual's samples have to be altered slightly to work with Commodore computers.

The Microline 182 offers 120 cps printing in Draft mode and 60 cps in Enhanced mode. Its graphics offerings, which consist of single, double and block graphics, are significantly meager in comparison with some other printers in this price range, but it is capable of printing Commodore graphics with an interface having that capability.

Its manual provides sufficient documentation for experienced users, but if you're inexperienced, you'd probably be happier with its successor, the Okidata 120, since its manual is more comprehensive.

Although the Okidata 120 evolved from the Microline 182, they are different printers aimed at two different markets. The Microline 182 is designed for office environments, and is therefore marketed through computer-

The Microline 182 is not quite as easy to use as the Okidata 120, but it offers a few more sophisticated print features.

The Okidata Microline 182.

specialty stores. On the other hand, the Commodore-dedicated Okidata 120 is a mass-merchandise machine, mainly sold in discount and department stores.

Like other parallel printers that have Commodore-dedicated versions, the Microline 182 is not quite as easy to use as the Okidata 120, but it offers a few more sophisticated print features. It's for that reason that I'd

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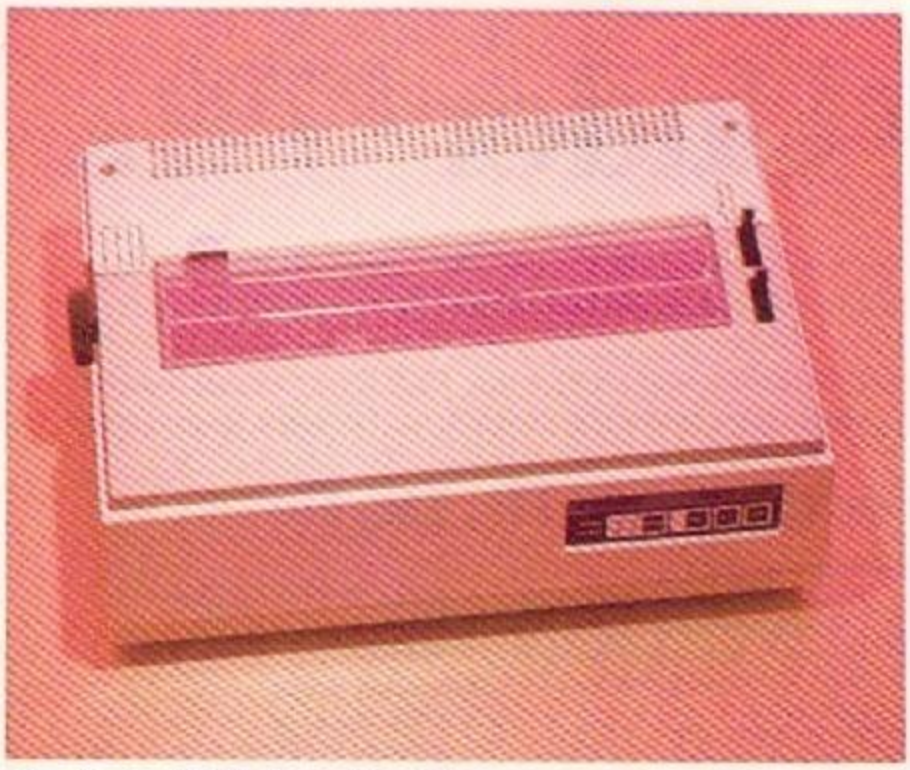

The Daisy 1120, from Aprotek.

recommend the 120 for inexperienced computerists and the Microline 182 for others. The 182 has a suggested retail price of $299.

Aprotek Daisy 1120

This daisywheel letter-quality printer from Aprotek contains a curious mix of software and hardware features that make it useful and unique. Although it's not a Commodore-dedicated printer, many Commodore owners have selected the Daisy 1120 for those features.

Foremost on the list are: a low price, a 2K buffer, a 20 cps printing speed, the ability to use Qume- and Diablo-compatible print wheels, and a multitude of paper-handling features and printing commands.

Print features include international characters selectable via a DIP switch, provided the print wheel contains those characters. Other features you can select with the DIP switches include page-length settings, line-feed activation and deactivation and Low Speed mode. The Low Speed mode is 25% slower than Standard mode and is necessary when using daisywheels that lack a prism protrusion. Without this protrusion, the print is weak at 20 cps. Slowing the printing speed alleviates this problem.

Other features accessible through DIP switches are control of data length, baud rate between printer and computer, bit length, parity and interface selection.

The use of control codes instead of DIP switches gives you programmable line feeds, margins, tab settings, and so on. Through control codes, you can also select backward printing, auto-centering and special-character printing. The user's manual lists all codes in hexadecimal form, and the programming samples are in a non-computer-specific Basic that requires a good working knowledge of Commodore Basic to properly convert them.

Control codes allow you to perform such functions as underlining and bold and double-strike printing. The Daisy 1120 is also capable of printing graphics, though in a rather crude fashion. You can create small bar graphs and diagrams, but it's a lot of work. The fact that one character is repeatedly printed, with a partial line feed after each impact during vertical printing, places a lot of strain on the hardware.

Unfortunately, a tractor-feed unit is only optional with this printer, and printing is very cumbersome without it. When printing, the Daisy 1120 accepts up to three copies beneath the original copy. Printing is performed by a film cassette ribbon, but an inked fabric or nylon cassette ribbon can be substituted to increase ribbon longevity.

Aprotek's Daisy 1120 emits only 58 decibels in operation. This is whisper-quiet compared to other daisywheel printers.

The 1120, with overall dimensions of 18.7 × 5.5 × 13.0 inches, dwarfs most of the dot-matrix printers reviewed here. Although it appears to be nearly twice the size of Okidata's Microline 182, its weight of 15.4 lbs. is only about one pound more than the Panasonic KX-P1091. Despite this unusually light weight, it emits only 58 decibels in operation—the same as the quiet Microline 182. This is whisper-quiet compared to other low-end daisywheel printers.

The 1120 is a fairly good printer, offering more features and flexibility than Commodore's own daisywheel, the Commodore DPS-1101. Experienced computerists would

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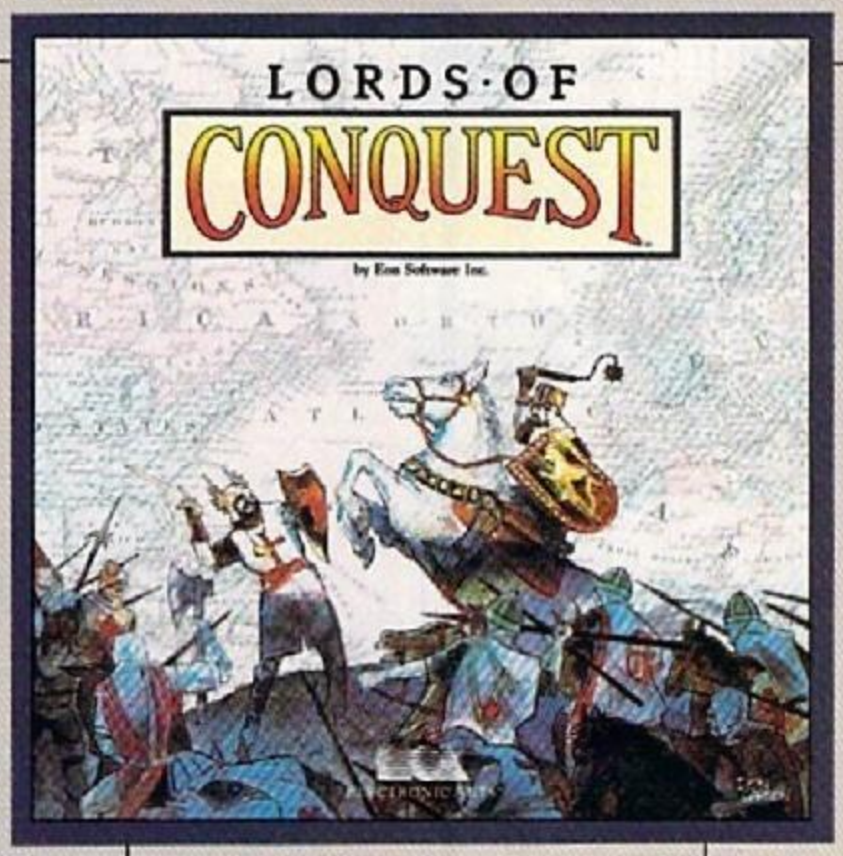

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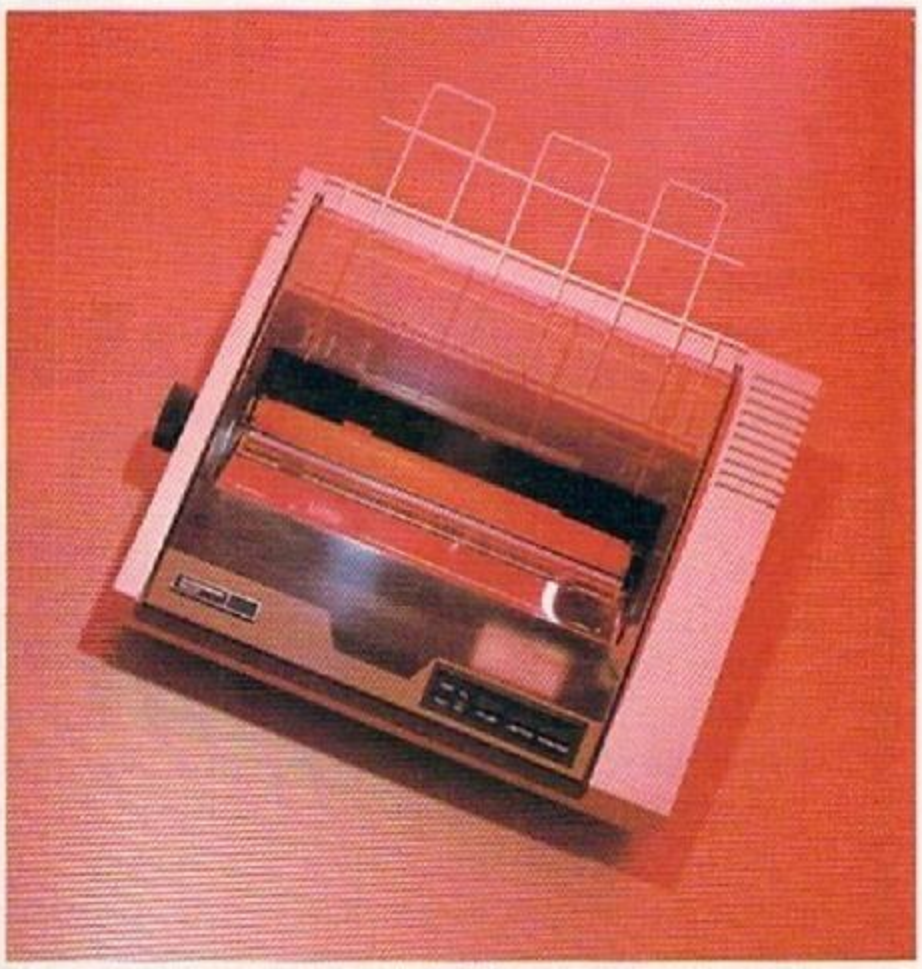
probably prefer the Daisy 1120. With a suggested retail price of $299.95, it's a fairly good value.

Mannesmann Tally Spirit 80

Although production of the trusty Spirit 80 ceased about ten months ago, a precious few still remain in the inventories of various mail-order houses. In spite of their decision to discontinue this printer, the people at Mannesmann Tally have assured me they will continue to provide support and service for this printer.



The Mannesmann Tally Spirit 80.

Due to its popularity and unique design, the Spirit 80 is likely to become a collector's item. With that in mind, I felt this article wouldn't be complete without at least mentioning it.

The Spirit 80 is a parallel printer and therefore requires a parallel interface when used with a C-64 or C-128. The fact that this printer has played a significant role for many Commodore computerists is reflected in the amount of software available with Spirit 80 print routines.

The Spirit 80 has a sleek, modern appearance that makes it look almost as contemporary as some of the low-end dot-matrix printers offered by Epson, Star Micronics and Okidata. Its print features include a speed of 80 cps, pica and compressed printing and double-size expanded in both modes. It also has standard and double-density bit-image printing capability. It comes with a small but thorough manual that does a good job of explaining how to program the printer.

Perhaps the most compelling reasons to consider purchasing a Spirit 80 are its sturdiness and the abundance of available software. Like other parallel printers, it's more of a programmer's machine than a neophyte's delight, but if you're fortunate enough to find and buy one of these classic printers, you're likely to be delighted with it. Prices are currently in the $200 to $230 range. R

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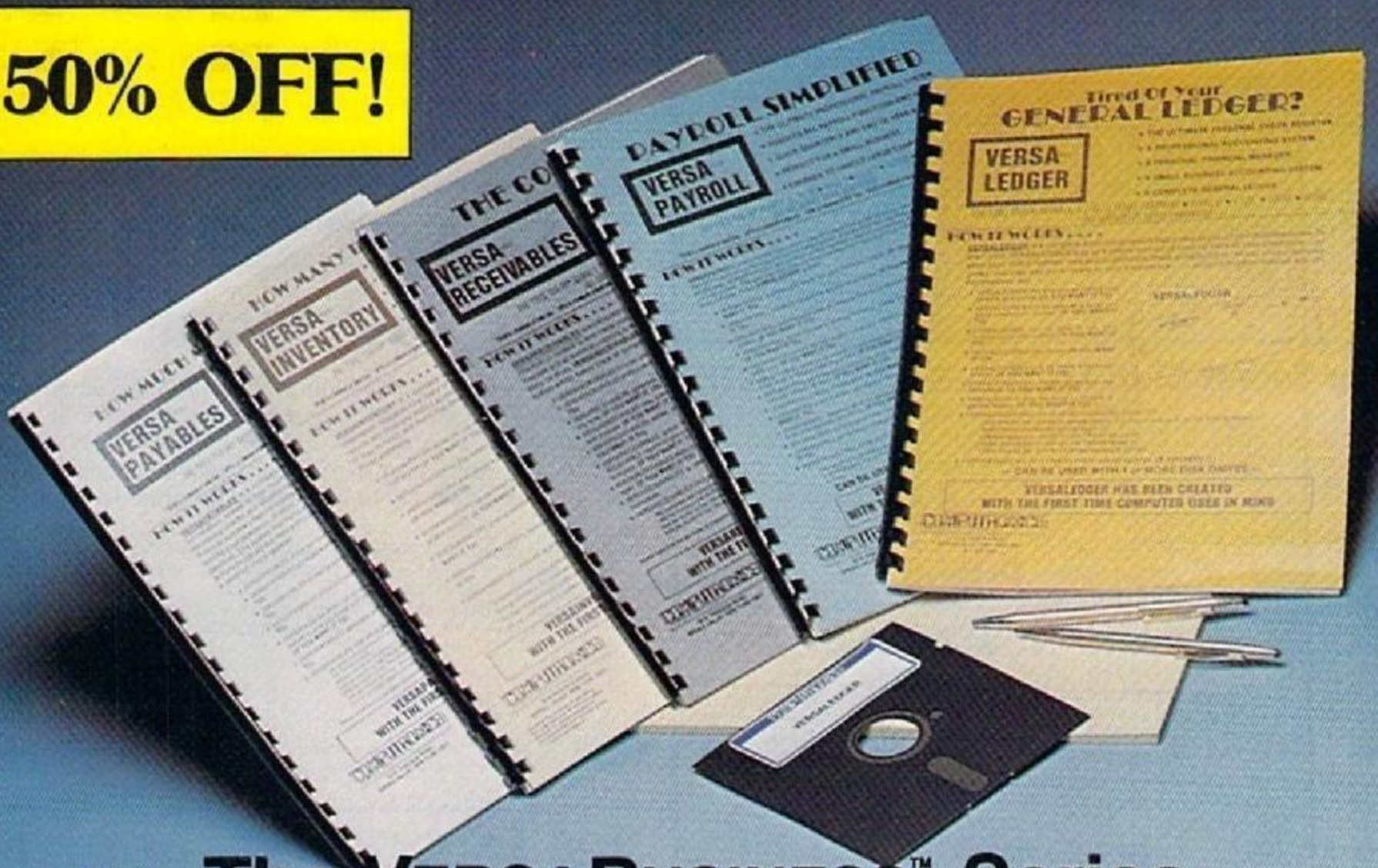

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Pitstop II	?	144 sec.	43 sec.	41 sec.	**31 sec.**
Music Shop	?	105 sec.	105 sec.*	105*	**21 sec.**
Hitchhiker's Guide to the Galaxy	?	70 sec.	70 sec.*	N.G.**	**68 sec.**
On-field Football	?	149 sec.	66 sec.	63 sec.	**56 sec.**
EASY FINANCE I	?	58 sec.	13 sec.	13 sec.	**11 sec.**

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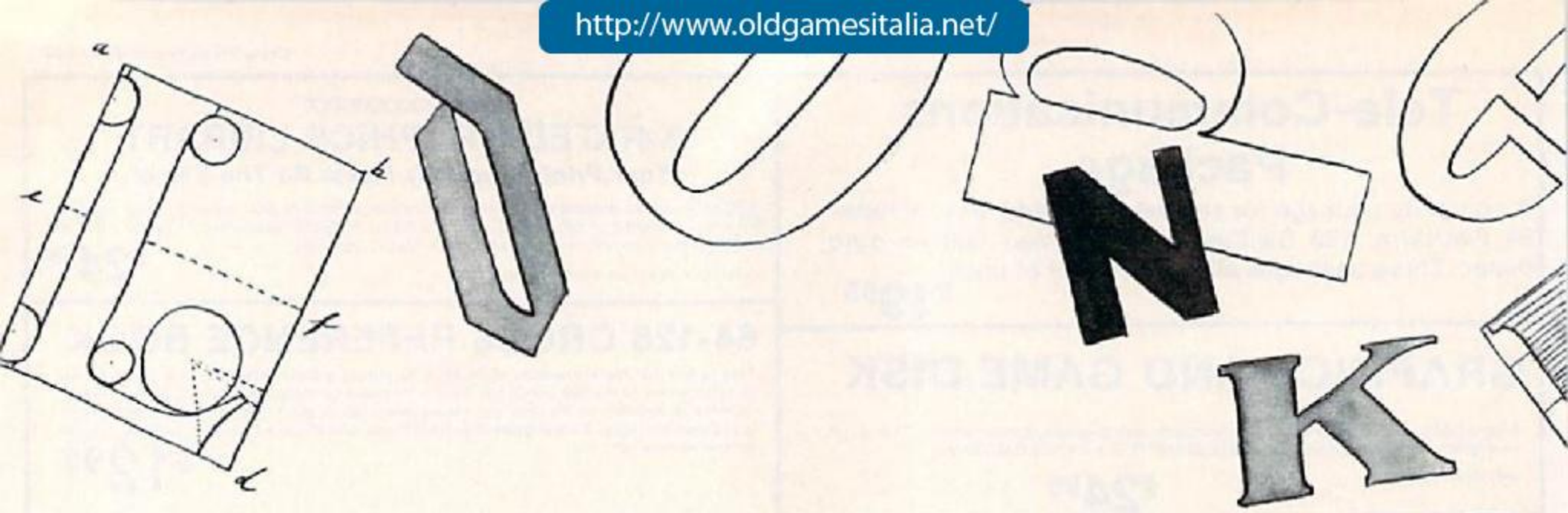

Give Your C-128 More Character

By FREDERICK GODDARD

The accompanying program, 80-Column Characters (Listing 1), lets you create your own character set, which can then be used in both 40- and 80-column modes and in the C-64 mode. First, I'll explain how the C-128 operates in 80-column mode. Then I'll provide a short Basic subroutine that allows you to use custom characters with 80 columns in your programs. Finally, I'll describe the 80-Column Characters program.

Although the *Commodore 128 System Guide* does not say so, it is actually easier to change the character set for the 80-column than for the 40-column mode. In the 40-column mode, the C-128 uses the same VIC chip as the C-64. This chip operates through the interrupt routine and reads the character set from memory 60 times each second.

This is a disadvantage when you try to design and use customized character sets in 40-column mode. You cannot run your program in Fast mode; you can only see 256 characters on the screen at any one time (128 characters each in normal and reverse); and you must normally give up 2K or more of memory to provide RAM storage for the character set as long as you use it.

Now you can redesign any or all of 512 characters and use them in your C-128 and C-64 programs.

80-Column Screen Mode

In 80-column mode, the C-128 operates in a completely different manner and without any of the drawbacks mentioned above. The 80-column mode is controlled by a separate processor, the 8563, which has its own independent memory. This processor displays all 512 characters on the screen at the same time. In addition, it provides for optional underlining of any character and automatically generates either a block (reverse) or underline cursor. This means you don't have to design reverse or underline characters in your set of 512; the 8563 does it for you.

Since you can have 512 different characters on the screen at the same time, and a normal full ASCII upper- and lowercase text set is only 96 characters, it is possible to design five different character fonts and display them on the screen simultaneously. For example, you could have regular, boldface, italic, italic-boldface and superscript character sets, all with optional underlining.

Since the 8563 chip has its own memory, you need allocate RAM for your character sets only temporarily. On startup, the C-128's 6510 microprocessor sends the character set data (the same ROM characters used by the VIC chip) to the 8563 through an initialization routine. The 8563 stores this information in its own

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C-128 (in 80-column mode)
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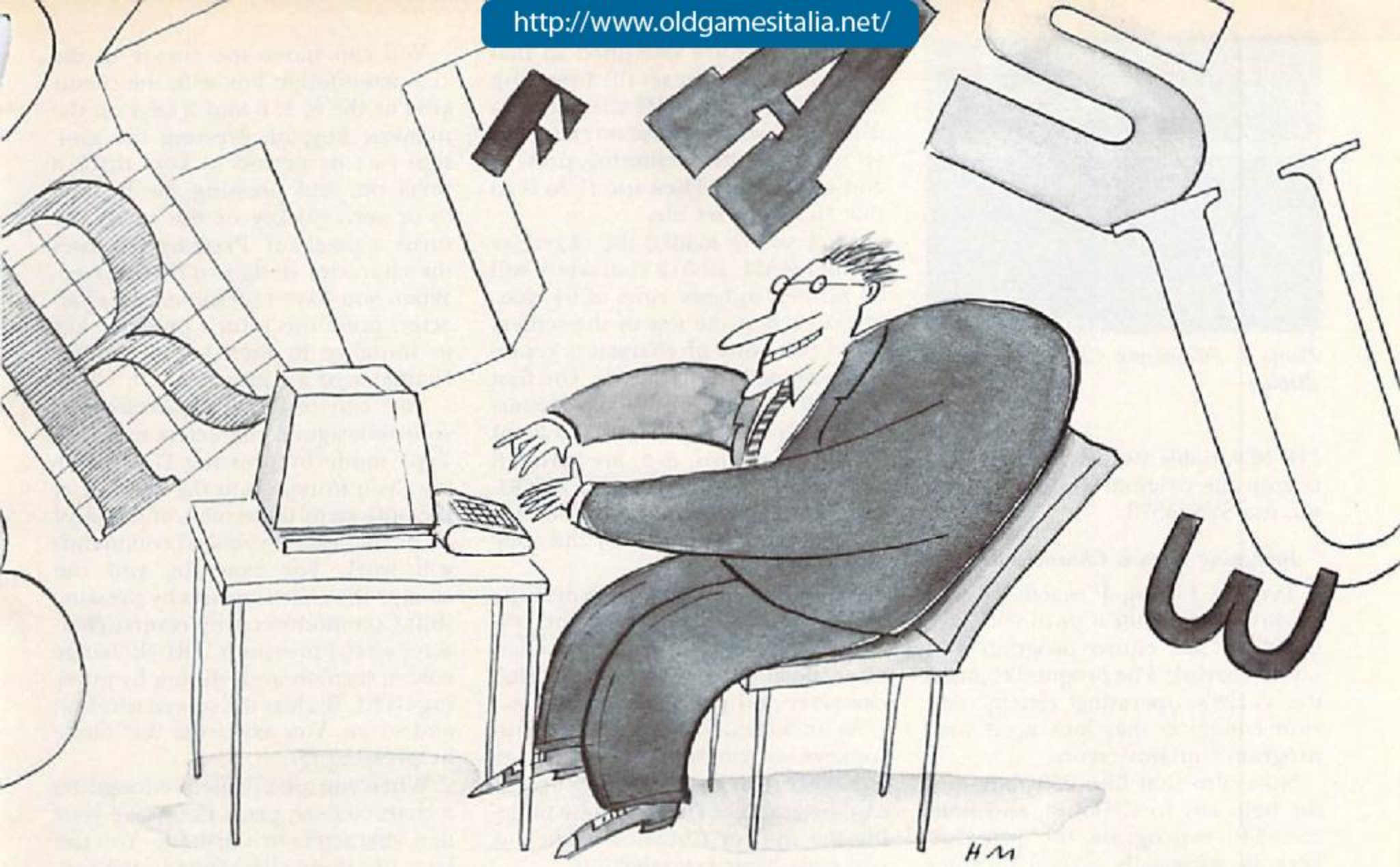

Illustration by Hal Mayforth

memory. You can, through this initialization routine, load your own custom character set into the 8563 memory, replacing the original set and freeing for other uses the RAM memory you had been using.

Changing 80-Column Characters

The initialization subroutine is used in the 80-Column Character program and is found in lines 40–80. This short, five-line Basic subroutine loads the character set from disk and creates and runs a machine language subroutine to perform the 8563 initialization.

The C-128 memory-management system uses 16 address banks to keep track of the various areas of ROM and RAM. This bank address system is described on page 370 of the C-128's system guide.

For the present discussion, it's important for you to know that bank 0 addresses the 64K of RAM that holds operating-system variables, 40-column screen memory and your Basic program text; bank 1 addresses 60K of RAM reserved for variables and strings; bank 14 addresses character ROM; and bank 15 addresses the Kernal routines that control the C-128 operating system. The machine language subroutine uses the existing Kernal routine found at $FF62 (65378 decimal) in ROM bank 15.

I could write a long machine language program that duplicates this ROM routine. Instead, I've written a very short wedge that uses the ROM routine but fools it into getting its data from RAM bank 1 instead of ROM bank 14. The Basic subroutine to load and initialize a custom character set is as follows.

```
20 POKE58,DEC("D0"):CLR:GOSUB30:
   GOTO90
30 BLOAD"CHRSET80",B1,P53248
40 RESTORE60:FORI = 0TODEC("2B"):
   READX$:POKEDEC("0200") + I,
   DEC(X$):NEXT
50 BANK15:SYSDEC("0200"):RETURN
60 DATA A9,20,8D,A2,02,A9,22,8D,
   A3,02,A9,02,8D,A4,02,20,62,FF
70 DATA A9,AD,8D,A2,02,A9,00,
   8D,A3,02,A9,FF,8D,A4,02,60
80 DATA A2,01,BD,F0,F7,AA,AD,00,FF,60
90 POKE58,DEC("FF"):CLR
```

You should place this Basic subroutine at the beginning of any Basic program that uses 80-column custom characters. Line 20 changes the top-of-memory in RAM bank 1 so that you can safely use memory starting at $D000 (decimal 53248) to make temporary space for the data. (Line 90 restores the memory pointer, giving you back all of bank 1 as free memory.) Line 30 loads the custom character set; line 40 reads the short machine language program from the Data statements and puts it at starting address $0200; and line 50 runs the machine language program.

As shown above, you should run the subroutine first in your [illegible] as any Basic variables will be lost by the action of lines 20 and 90. If you want to run this initialization routine later in your program, you should set the top of memory (line 20) at the beginning of your program and omit line 90. This means that you will lose

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Photo 1. 80-Column Characters screen display.

11K of variable storage in bank 1. To restore the original ROM character set, use SYS65378.

Designing Custom Characters

Type in Listing 1 exactly as it is shown. Do not run it until you have typed in the entire program and saved it to disk. The program changes the C-128's operating system, and your computer may lock up if your program contains errors.

Note also that line 230 redefines the help key to CHR$(8), and lines 235–240 reprogram the function keys. Be especially careful to enter correctly the sequence of characters in lines 245 and 250.

When you run 80-Column Characters, the Help screen appears on the bottom half of the display. It contains all the instructions for using the program, and you may recall it at any time by pressing the help key. The function keys are redefined so that f1 loads a character set file from disk and f3 copies the ROM characters to disk. Since you will have no character set on disk at the beginning, press f3 and create one. Then use f1 to load that character set file.

After you've loaded the character set into RAM, all 512 characters will be printed in eight rows of 64 characters each at the top of the screen. Every two rows of characters represent a set of 128 characters. The first two sets (rows 1–4) are the characters obtained by the command Print CHR$(142); rows 3–4 are printed when you are in Reverse mode (CTRL 9). The last two sets (rows 5–8) are the characters obtained by the command Print CHR$(14).

A blinking cursor appears over the @ character at the top left-hand corner of the screen. To redesign a character, position the cursor over that character and press the return key.

As an alternative to using the cursor keys, you can simply press the key you wish to redesign. Select uppercase or graphics characters by pressing the shift or Commodore key as you make your key selection.

After you select the character you wish to redesign, it will appear in an 8 × 8 yellow box at the top right-hand corner of the screen. Each cell in the box represents one pixel (dot) in the screen character. Yellow cells represent pixel-off, and brown cells represent pixel-on.

You can move the cursor in the character-design box with the cursor keys or the 8, 4, 6 and 2 keys on the numeric keypad. Pressing the plus-sign (+) or period (.) keys turns a pixel on, and pressing the hyphen (-) or zero (0) key or the space bar turns a pixel off. Pressing R causes the character design to be reversed. When you have redesigned the character, press the return or enter key to initialize it; then select another character or a command.

You can test the appearance of your redesigned characters in a Test-Type mode by pressing f7. This allows you to type into the window at the bottom of the screen, and almost all of the usual keyboard commands will work. For example, you can change the character sets by pressing shift-Commodore; print reverse character sets by pressing CTRL-9; change colors; turn on underlining by pressing CTRL-B; clear the screen window; and so on. You exit from this mode by pressing f7.

When you are finished redesigning a character set, press f5 to save your new characters to a disk file. You can later use these characters in the programs you write by using the BLoad command and the initialization subroutine in lines 40–80 to load the character set file into RAM. R

Address all author correspondence to Frederick Goddard, 4828 NW 17th Place, Gainesville, FL 32605.

Listing 1. *80-Col. Characters program.*

```
10 REM *{2 SPACEs}80-COLUMN CUST
   OM CHARACTERS{2 SPACEs}******
   ***{2 SPACEs}BY FRED GODDARD
                              :REM*32
15 FAST                       :REM*53
20 POKE58,DEC("D0"):CLR:GOSUB40:
   GOTO225                    :REM*214
40 RESTORE60:FORI=0TODEC("2B"):R
   EADX$:POKEDEC("0200")+I,DEC(X
   $):NEXT                    :REM*110
50 BANK15:SYSDEC("0200"):RETURN
                              :REM*34
60 DATA A9,20,8D,A2,02,A9,22,8D,
   A3,02,A9,02,8D,A4,02,20,62,FF
                              :REM*102
70 DATA A9,AD,8D,A2,02,A9,00,8D,
   A3,02,A9,FF,8D,A4,02,60
                              :REM*162
80 DATA A2,01,BD,F0,F7,AA,AD,00,
   FF,60                      :REM*40
100 COLOR5,8:WINDOW68,0,75,7,1:B
    ANK1                      :REM*176
105 FORY=0TO7:FORX=0TO7 :REM*205
110 IFPEEK(V+Z*8+Y)AND2{UP ARROW
    }(7-X)THENPRINT"{COMD 5} ";:
    ELSEPRINT"{CTRL 8} ";:REM*38
115 NEXT:NEXT                 :REM*119
120 Y=0:X=0:PRINT"{HOME}";
                              :REM*144
125 IFPEEK(V+Z*8+Y)AND2{UP ARROW
    }(7-X)THENPRINT"{COMD 5}";
                              :REM*173
130 GETKEYK$                  :REM*16
135 IF(K$="{CRSR DN}")OR(K$="2")
    THENPRINT"{CRSR DN}";:Y=-(Y+
    1)*(Y<7):GOTO125          :REM*217
140 IF(K$="{CRSR UP}")OR(K$="8")
    THENPRINT"{CRSR UP}";:Y=-(Y-
    1)*(Y>0):GOTO125          :REM*168
145 IF(K$="{CRSR RT}")OR(K$="6")
    THENBEGIN:PRINT"{CRSR RT}";:
    X=-(X+1)*(X<7):IFX=0THENY=-(
    Y+1)*(Y<7)                :REM*233
150 GOTO125:BEND              :REM*56
155 IF(K$="{CRSR LF}")OR(K$="4")
    THENBEGIN:PRINT"{CRSR LF}";:
    IFXTHENX=X-1:GOTO125      :REM*39
160 IFYTHENX=7:Y=Y-1          :REM*198
165 GOTO125:BEND              :REM*71
170 IF(K$=" ")OR(K$="0")OR(K$="-
    ")THENBEGIN:POKEV+Z*8+Y,PEEK
    (V+Z*8+Y)AND(255-2{UP ARROW}
    (7-X))                    :REM*210
175 PRINT"{CTRL 8} ";:X=-(X+1)*(
    X<7):IFX=0THENY=-(Y+1)*(Y<7)
                              :REM*239
180 GOTO125:BEND              :REM*86
185 IF(K$=".")OR(K$="+")THENBEGI
    N:POKEV+Z*8+Y,PEEK(V+Z*8+Y)O
    R2{UP ARROW}(7-X)         :REM*35
190 PRINT"{COMD 5} ";:X=-(X+1)*(
    X<7):IFX=0THENY=-(Y+1)*(Y<7)
                              :REM*158
195 GOTO125:BEND              :REM*101
200 IFK$="R"THENFORY=0TO7:POKEV+
    Z*8+Y,XOR(PEEK(V+Z*8+Y),255)
    :NEXT:GOTO105             :REM*58
205 IFK$=CHR$(13)THENGOSUB440:RET
    URN                       :REM*131
210 IFK$=CHR$(8)THENGOSUB635:GOT
    O100                      :REM*240
215 GOTO130                   :REM*193
225 ES$=CHR$(27):V=53248:PRINTCH
    R$(14)ES$"R"ES$"M{CTRL 4}{SH
    FT CLR}{2 CRSR DNs}{3 SPACEs
    }{SHFT S}ELECT <{SHFT F}1> O
    R <{SHFT F}3>             :REM*53
230 X=0:POKE4105,1:FORI=4096TO41
    05:X=PEEK(I)+X:NEXT:POKE4105
    +X,8                      :REM*4
235 R=0:C=0:Z=0:KEY1,CHR$(133):K
    EY3,CHR$(134):KEY5,CHR$(135)
    :KEY7,CHR$(136)           :REM*187
240 KEY2,"":KEY4,"":KEY6,"":KEY8
    ,""                       :REM*240
245 A1$="@ABCDEFGHIJKLMNOPQRSTUV
    WXYZ[{LB.)]{UP ARROW}{LEFT A
    RROW} !"+CHR$(34)+"#$%&'()*+
    ,-./0123456789:;<=>?":REM*55
250 A2$="{SHFT *}{SHFT A}{SHFT B
    }{SHFT C}{SHFT D}{SHFT E}{SH
    FT F}{SHFT G}{SHFT H}{SHFT I
    }{SHFT J}{SHFT K}{SHFT L}{SH
    FT M}{SHFT N}{SHFT O}{SHFT P
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Listing continued.

```
    }{SHFT Q}{SHFT R}{SHFT S}{SH
    FT T}{SHFT U}{SHFT V}{SHFT W
    }{SHFT X}{SHFT Y}{SHFT Z}{SH
    FT +}{COMD -}{SHFT -}{PI}{CO
    MD *} {COMD K}{COMD I}{COMD
    T}{COMD @}{COMD G}{COMD +}{C
    OMD M}{COMD LB.}{SHFT LB.}{C
    OMD N}{COMD Q}{COMD D}{COMD
    Z}{COMD S}{COMD P}{COMD A}{C
    OMD E}{COMD R}{COMD W}{COMD
    H}{COMD J}{COMD L}{COMD Y}{C
    OMD U}{COMD O}{SHFT @}{COMD
    F}{COMD C}{COMD X}{COMD V}{C
    OMD B}"                 :REM*2ØØ
255 GOSUB67Ø                :REM*97
26Ø GETKEYK$:IFK$>CHR$(132)THENI
    FK$<CHR$(135)THEN29Ø:ELSE26Ø
                            :REM*13
27Ø WINDOWØ,Ø,63,7          :REM*141
275 PRINTES$"F{HOME}{CTRL 4)";:I
    FRTHENFORI=1TOR:PRINT"{CRSR
    DN}";:NEXT              :REM*46
28Ø PRINTTAB(C);            :REM*197
285 GETKEYK$                :REM*172
29Ø IFK$=CHR$(133)THENGOSUB385:G
    OTO27Ø                  :REM*231
295 IFK$=CHR$(134)THENGOSUB43Ø:G
    OTO27Ø                  :REM*17Ø
3ØØ IFK$=CHR$(135)THENGOSUB475:G
    OTO27Ø                  :REM*187
3Ø5 IFK$=CHR$(136)THEN565:REM*9Ø
31Ø IFK$=CHR$(8)THEN6Ø5 :REM*225
315 IFK$="{CRSR DN}"THENR=-(R+1)
    *(R<7):PRINTK$;:GOTO285
                            :REM*182
32Ø IFK$="{CRSR UP}"THENR=-(R-1)
    *(R>Ø):PRINTK$;:GOTO285
                            :REM*121
325 IFK$="{CRSR RT}"THENBEGIN:PR
    INTK$;:C=-(C+1)*(C<63):IFC=Ø
    THENR=R-(R+1)*(R<7)   :REM*54
33Ø GOTO285:BEND            :REM*85
335 IFK$="{CRSR LF}"THENBEGIN:PR
    INTK$;:IFCTHENC=C-1:GOTO285
                            :REM*148
34Ø IFRTHENC=63:R=R-1       :REM*47
345 GOTO285:BEND            :REM*1ØØ
35Ø IFK$=CHR$(13)THENZ=C+R*64:GO
    SUB1ØØ:GOTO27Ø          :REM*215
355 IF(96AND(ASC(K$)))THENBEGIN:
    R=6ANDR                 :REM*26
36Ø C=INSTR(A1$,K$):IFCTHENC=C-1
    :GOTO275                :REM*43
365 C=INSTR(A2$,K$):IFCTHENR=R+1
    :C=C-1:GOTO275          :REM*7Ø
37Ø BEND                    :REM*55
375 GOTO285                 :REM*9Ø
385 GOSUB535                :REM*6Ø
39Ø PRINTCHR$(14)ES$"L"ES$"E{SHF
    T CLR}{CRSR DN}{SHFT L}OAD {
    SHFT C}HARACTER {SHFT S}ET?
    ({SHFT Y}/{SHFT N})" :REM*25
395 GETKEYK$:IFK$<>"Y"THEN42Ø
                            :REM*96
4ØØ X$="":PRINT"{CRSR DN}{SHFT F
    }ILENAME";:INPUTX$:X$=LEFT$(
    X$,16):IFX$=""THEN42Ø
                            :REM*227
4Ø5 BLOAD""+X$,B1,P53248:IFDSTHE
    N41Ø:ELSE425            :REM*128
41Ø PRINT"{2 CRSR DNs}"DS$:PRINT
    "{CRSR DN}{SHFT T}RY AGAIN?
    ({SHFT Y}/{SHFT N}) :REM*149
415 DCLOSE:GETKEYK$:IFK$="Y"THEN
    4ØØ                     :REM*196
42Ø PRINTES$"M{SHFT CLR}":RETURN
                            :REM*81
425 PRINTES$"M{SHFT CLR}":GOSUB4
    Ø:GOSUB54Ø:RETURN       :REM*4
43Ø GOSUB535                :REM*1Ø5
435 PRINTCHR$(14)ES$"L"ES$"E{SHF
    T CLR}{CRSR DN}{SHFT C}OPY {
    CTRL 8}{SHFT R}{SHFT O}{SHFT
     M}{COMD 4} CHARACTER SET TO
     DISK? ({SHFT Y}/{SHFT N})
                            :REM*186
44Ø GETKEYK$:IFK$<>"Y"THEN47Ø
                            :REM*151
445 X$="":PRINT"{CRSR DN}{SHFT F
    }ILENAME";:INPUTX$:X$=LEFT$(
    X$,16):IFX$=""THEN47Ø:REM*82
45Ø BSAVE""+X$,B14,P53248TOP5734
    4                       :REM*215
455 PRINT"{2 CRSR DNs}"DS$:IFDS=
    ØTHEN47Ø                :REM*222
46Ø DCLOSE:PRINT"{CRSR DN}{SHFT
    T}RY AGAIN? ({SHFT Y}/{SHFT
    N})                     :REM*83
465 GETKEYK$:IFK$="Y"THEN445
                            :REM*16Ø
47Ø PRINTES$"M{SHFT CLR}":RETURN
                            :REM*131
475 GOSUB535                :REM*15Ø
48Ø PRINTCHR$(14)ES$"L"ES$"E{SHF
    T CLR}{CRSR DN}{SHFT S}AVE C
    HARACTER SET? ({SHFT Y}/{SHF
    T N})                   :REM*2Ø3
485 GETKEYK$:IFK$<>"Y"THEN525
                            :REM*2Ø8
49Ø X$="":PRINT"{CRSR DN}{SHFT F
    }ILENAME";:INPUTX$:X$=LEFT$(
    X$,16):IFX$=""THEN525
                            :REM*223
495 BSAVE""+X$,B1,P53248TOP57344
    :IFDS<>63THEN51Ø        :REM*112
5ØØ PRINT"{2 CRSR DNs}"DS$"{4 SP
    ACEs}{SHFT R}EPLACE? ({SHFT
    Y}/{SHFT N})":DCLOSE:GETKEYK
    $:IFK$<>"Y"THEN525      :REM*39
5Ø5 BSAVE"@"+X$,B1,P53248TOP5734
    4                       :REM*252
51Ø PRINT"{2 CRSR DNs}"DS$:IFDS=
    ØTHENSLEEP1:GOTO525 :REM*119
515 DCLOSE:PRINT"{CRSR DN}{SHFT
    T}RY AGAIN? ({SHFT Y}/{SHFT
    N})                     :REM*139
52Ø GETKEYK$:IFK$="Y"THEN48Ø
                            :REM*21Ø
525 PRINTES$"M{SHFT CLR}":GOSUB4
    Ø:RETURN                :REM*211
535 BANK15:SYS65378:COLOR5,12:WI
    NDOWØ,9,79,24,1:RETURN:REM*5
54Ø COLOR5,8:WINDOW68,Ø,75,7,1:C
    OLOR5,4:WINDOWØ,Ø,65,7,1
                            :REM*228
545 PRINTCHR$(142)A1$:PRINTA2$:P
    RINT"{CTRL 9}"A1$:PRINT"{CTR
    L 9}"A2$                :REM*2Ø5
55Ø PRINTCHR$(14)A1$:PRINTA2$:PR
    INT"{CTRL 9}"A1$:PRINT"{CTRL
     9}"A2$                 :REM*24
555 R=Ø:C=Ø:WINDOWØ,Ø,63,7:RETUR
    N                       :REM*27
565 PRINTES$"F{COMD 4}";:WINDOWØ
    ,9,79,24,1:REM TEST-TYPING M
    ODE                     :REM*153
57Ø GETKEYK$                :REM*2Ø2
575 IFK$=CHR$(136)THEN27Ø
                            :REM*199
58Ø IFK$=CHR$(8)THEN65Ø :REM*16Ø
585 IFK$=CHR$(34)THENK$=K$+ES$+"
    O"                      :REM*141
59Ø IFK$="{HOME}"THENK$=K$+"{CRS
    R RT}{CRSR LF}"         :REM*3Ø
595 PRINTK$;:GOTO57Ø        :REM*117
6Ø5 GOSUB535:GOSUB685       :REM*231
61Ø PRINT"{CTRL 4}{SHFT P}RESS F
    UNCTION KEY TO SELECT COMMAN
    D OR <{SHFT R}ETURN> TO END
    {SHFT H}{SHFT E}{SHFT L}{SHF
    T P}.";                 :REM*222
615 PRINTES$"E";            :REM*117
62Ø GETKEYK$:IFK$=CHR$(13)THENGO
    SUB4Ø:GOTO27Ø           :REM*56
625 IFK$>CHR$(132)THENIFK$<CHR$(
    137)THEN29Ø             :REM*253
63Ø GOTO62Ø                 :REM*122
635 GOSUB67Ø                :REM*223
64Ø GETKEYK$:IFK$<>CHR$(13)THEN6
    4Ø                      :REM*18Ø
645 GOSUB4Ø:PRINTES$"F":RETURN
                            :REM*23
65Ø GOSUB535:GOSUB67Ø       :REM*254
655 GETKEYK$:IFK$=CHR$(136)THEN5
    75                      :REM*251
66Ø IFK$=CHR$(13)THENGOSUB4Ø:PRI
    NTES$"F{COMD 4}{SHFT CLR}";:
    GOTO57Ø                 :REM*254
665 GOTO655                 :REM*1Ø9
67Ø GOSUB535:GOSUB685       :REM*4Ø
675 PRINT"{SHFT E}XIT {SHFT T}ES
    T-{SHFT T}YPE WITH <{SHFT F}
    7>.{7 SPACEs}{CTRL 4}{SHFT P
    }RESS <{SHFT R}ETURN> TO END
     {SHFT H}{SHFT E}{SHFT L}{SH
    FT P}.";                :REM*137
68Ø PRINTES$"E";:RETURN     :REM*18
685 PRINTCHR$(14)"{SHFT H}ELP {S
    HFT S}CREEN--{SHFT V}IEW {SH
    FT H}ELP SCREEN AT ANY TIME
    BY HITTING THE <{SHFT H}{SHF
    T E}{SHFT L}{SHFT P}> KEY ON
     TOP ROW.               :REM*47
69Ø PRINT"{SHFT H}IT FUNCTION KE
    Y TO SELECT COMMAND::REM*132
695 PRINT"{4 SPACEs}<{SHFT F}1>
    {SHFT L}OAD CHARACTER SETS F
    ROM DISK{3 SPACEs}<{SHFT F}3
    > {SHFT C}OPY {SHFT R}{SHFT
    O}{SHFT M} CHARACTER SET TO
    DISK                    :REM*9
7ØØ PRINT"{4 SPACEs}<{SHFT F}5>
    {SHFT S}AVE CHARACTER SETS T
    O DISK{5 SPACEs}<{SHFT F}7>
    {SHFT E}NTER/{SHFT E}XIT {SH
    FT T}EST-{SHFT T}YPING {SHFT
     M}ODE                  :REM*16
7Ø5 PRINT"{3 SPACEs}{SHFT F}OUR
    CHARACTER SETS WILL BE DISPL
    AYED AT THE TOP OF THE SCREE
    N IN EIGHT ROWS.    :REM*229
71Ø PRINT"{SHFT T}O SELECT CHARA
    CTER TO BE REDESIGNED, MOVE
    CURSOR UP/DOWN TO SELECT CHA
    RACTER                  :REM*222
715 PRINT"SET, THEN EITHER MOVE
    CURSOR TO CHARACTER DESIRED
    OR PRESS KEY CORRESPONDING T
    O                       :REM*159
72Ø PRINT"THE CHARACTER DESIRED
    (USE SHIFT OR LOGO KEYS IF A
    PPROPRIATE).{2 SPACEs}{SHFT
    W}HEN CURSOR IS         :REM*7Ø
725 PRINT"OVER DESIRED CHARACTER
    , HIT <RETURN> TO ENTER DESI
    GN MODE.                :REM*227
73Ø PRINT"{3 SPACEs}{SHFT I}N DE
    SIGN MODE THE CHARACTER IS D
    ISPLAYED IN YELLOW BOX AS EI
    GHT COLUMNS AND         :REM*6Ø
735 PRINT"ROWS.{2 SPACEs}{SHFT U
    }SE CURSOR KEYS OR NUMERIC P
    AD (8,4,6,2 FOR UP,LF,RT,DN)
     TO MOVE CURSOR.        :REM*51
74Ø PRINT"{SHFT U}SE {CTRL 4}+{C
    OMD 4} OR {CTRL 4}.{COMD 4}
    KEYS TO FILL A CELL, {CTRL 4
    }{SHFT S}PACE{COMD 4}, {CTRL
     4}-{COMD 4} OR {CTRL 4}Ø{CO
    MD 4} TO BLANK A CELL, AND {
    CTRL 4}{SHFT R}{COMD 4} TO R
    EVERSE                  :REM*194
745 PRINT"THE CHARACTER.{2 SPACE
    s}{SHFT W}HEN THE DESIGN IS
    COMPLETE, HIT <RETURN> TO FI
    X THE DESIGN AND    :REM*229
75Ø PRINT"RETURN TO THE MAIN MOD
    E.                      :REM*1Ø6
755 PRINT"{3 SPACEs}{SHFT I}N {S
    HFT T}EST-{SHFT T}YPING MODE
    , YOU CAN USE THE KEYBOARD T
    O TEST THE APPEARANCE OF YOU
    R                       :REM*179
76Ø PRINT"NEW CHARACTER SET.{2 S
    PACEs}";:RETURN     :REM*166
```


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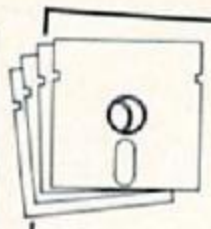

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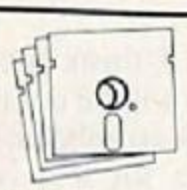

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GROLIER—LEADING THE WAY IN EDUCATION

An interview with Kathleen Hurley, vice-president of Grolier Electronic Publishing.

By MARGARET MORABITO

Kathleen Hurley joined Grolier Electronic Publishing in April 1984 to set up its microcomputer software department.

Ms. Hurley has extensive experience in the field of educational software, having worked with companies such as Intentional Educations, Talmis, Developmental Learning Materials (DLM) and, now, Grolier. She has a master's degree in special education and was formerly a learning disabilities teacher.

Grolier is well-known for its encyclopedias and for providing on-line access to them through several major information networks. It is also a leader in educational software development for microcomputers, including the C-64 and C-128.

The first part of this interview deals with the education market for microcomputers and Grolier's participation in this area. The second part moves into a discussion of the C-64 and the C-128 in the field of education.

RUN: What does the educational market for microcomputers look like now? Is it growing or on the decline?

KH: I think the market for computer systems is on the decline because the schools are really at a crossroads. They're looking at larger systems and, I think, trying to decide where they want to go in the future. But they are buying lots of software, and they're buying peripherals such as modems and printers. They're getting into CD-ROMs, video disks... that kind of thing.

RUN: In your view, is the home computer market dead?

KH: It's not really dead, but neither is it very alive. It's kind of in a slump.

Educational software still has a big market in the home, but there is some confusion on the part of the parents. Parents don't even know how to teach their kids to read in traditional ways. When you bring in software, it becomes even more confusing. I think there is a market and it will continue to grow, but I don't think it's really that big yet. Eventually, I think the home and school markets will be connected.

The marketing channels are changing, too. There's a lot less retail. I don't think people are running into their corner software store to buy software. But, parents are buying through catalogs that come to the home, and they see products on TV. They are buying software, but they're not buying through the channels software people expected.

RUN: Does Grolier distinguish between the home education market and the school market in its software design and marketing?

KH: Yes. We have a home package that is $10 less than the school package. The home package just has one disk and a guide for parents. The school package has two disks and a teacher's guide. We also have lab packs for schools; these consist of six disks and a teacher's guide. All the products we sell are either home/retail packages, school packages or lab packs.

And our marketing is a little dif-

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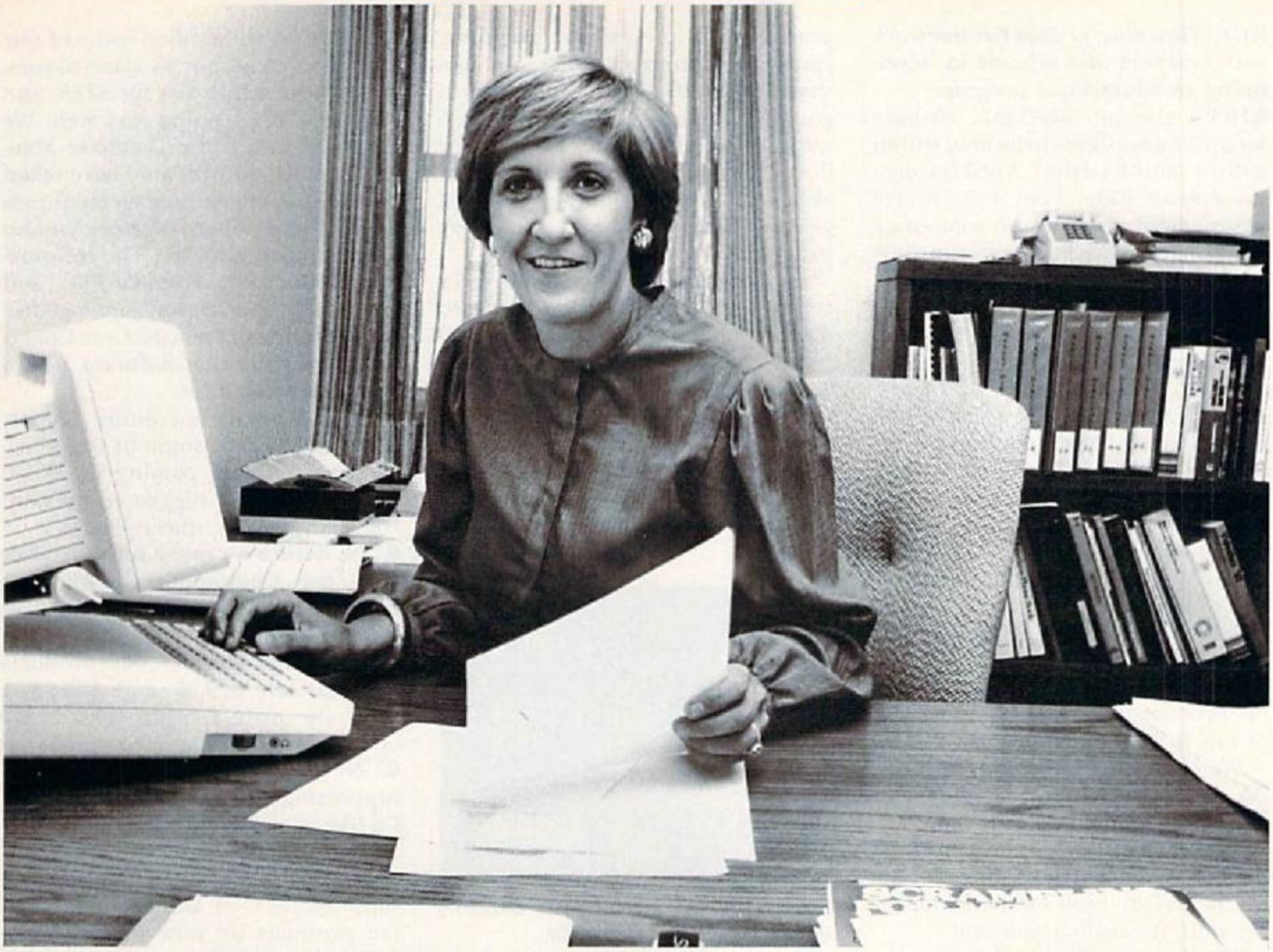

Photo 1. Kathleen Hurley, vice-president of Grolier Electronic Publishing.

ferent. We put out a catalog that goes into the schools, and we do telemarketing. As far as the homes are concerned, we use more advertising, dealers and representatives. But the school market is our bigger market. We believe the school market will eventually have a decisive influence on the home software market.

RUN: What are the major differences between educational software for the home and that made for the schools?

KH: What we try to do (even with our advertising) is tie the software more into the curriculum. We try to show the teachers how our tools can be tied into social studies, reading, etc. In our teacher guides, we try to have lesson plans, black-line masters—more support materials that the teacher can use. The home packages just aren't as comprehensive. Of course, they aren't as expensive, either.

We're doing something called a Curriculum Guide that we're going to be giving away to schools that purchase 75 dollars' worth of our software. The guide provides detailed lesson plans for our major products across the curriculum: language arts, math, reading, social studies, science, and then into special ed and libraries. I think that's what teachers are looking for—how the products are tied into their schools. The guide will be available at the end of March, and we're really excited about it.

RUN: What problems do software manufacturers such as Grolier encounter when dealing with the educational market?

KH: Lots. One is making sure that we've upgraded our software to match the machines. The hardware keeps changing. And then there's the whole idea of networking and site licensing. Schools are getting more adamant in their desire to buy unprotected copies and to make numerous copies.

There's also the high cost of previewing, which is something the schools want to do. They want to take the product for 30 days and then return it if they don't like it. The publishers have a hard time with that.

RUN: How has Grolier gone about solving these problems?

KH: First of all, we're one of the first companies to really bite the bullet and come out with a policy on site licensing. The policy says that if you want to buy so many of our products and use them in so many schools, we have a price set on how much it's going to be for each of those products.

RUN: Do you foresee that other software companies will follow suit?

KH: Oh yes. I'm Chairperson of the Education Committee of the Software Publisher's Association, and these are the issues we're discussing.

RUN: Will this site licensing take care of schools that want to use the software for networking?

KH: Yes. We are currently testing our software on all major network systems to determine compatibility. But our new policy does embrace both site licensing and networking.

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RUN: How closely does Grolier work with teachers and schools in developing an educational program?
KH: I'm glad you asked that. We have set up 20 workshops to be held within a three-month period: April through the end of June. They will involve large school districts and some state departments. We'll discuss not only software but CD-ROM, video disk and on-line technology.

We're going to try to show teachers and administrators how all of these technologies fit together. We're providing teacher training, which I think is becoming critically important, especially as we get into some of these new technologies. And, we're working closely with Commodore and Apple on those projects.
RUN: Will you be getting feedback from teachers?
KH: We're definitely going to use this as an opportunity to get feedback. We've got a questionnaire planned on product development and some of our marketing strategies.

We always work with teachers. We do a lot of telephone surveys and exhibits at the district and state levels. We're talking with teachers all the time. Given that I'm an ex-teacher, as are most of the people on my staff, it's really important.
RUN: Do you have programmers who are teachers?
KH: We work with software development houses, as opposed to having in-house programmers. All these development houses have teachers working on the projects. And of course all our documentation is written by teachers. Our Curriculum Guide was written by six teachers in the different content areas.
RUN: How do you determine the need for a specific program?
KH: We do a lot of telemarketing surveys. We talk to people—mostly teachers and administrators—on the phone. We have focus groups, such as we're having at the workshop meetings. We are in very close contact with the state microcomputer coordinators trying to find out what's going on. We do a lot of exhibits where we don't just send in a representative; I'll go myself, or our director of marketing, Howard Zack, will go. We really make an effort to talk to teachers.
RUN: What kinds of software and computer applications do teachers want to see developed for schools?
KH: They are still very interested in tools—database management programs, word processing, graphing, spreadsheet programs. But more than that, they want the print materials to go with these programs. They also want lesson plans. They want to see how the products can be used. They also want teacher tools—tools that generate tests, worksheets, gradebook programs, and such.

Also, any software that a producer comes out with should be tied into the curriculum so that teachers can see with what grade level they should be using this. They want to see some kind of continuity.

And problem solving is a big area. Problem solving across the curriculum. Teachers are interested in software that lets you make decisions while you're working on the screen.

Photo 2. Screen display from Grolier's The Information Connection.

The printer, too, has become really big in the classroom. You'll see more programs like Newsroom and Print Shop, for example. And we have a new program called The Information Connection, which uses a modem for teaching telecommunications. I do believe that there are a lot of things like that.

Another program we released—one that really came directly out of a focus group—was a program that we call Play Together, Learn Together. Teachers and parents can learn to use the computer together with young children. It's for three- to five-year-old kids and is really a fun program. For example, as the parents and kids are learning how they use colors on a computer, they can go outside and try to find a flower or a rainbow with those colors, then talk about colors further. It ties the computer into their everyday life. It's a unique approach to teaching computer literacy.
RUN: Does Grolier handle courseware for schools?
KH: Yes, we've bundled some of our tools that came out as stand-alones. We put them into kits for $189, and they have been doing very well. We have one called the Database Management Kit, in which we have taken all of our database management programs and put them together. We also have bundled EduCalc, The Information Connection, Friendly Filer and EasyGraph; and we put them together for $189 and call them the Core Collection, or Application Software. That's been real good for us.

Teachers want an entire course. And that's where some of these bigger networks are coming in. You'll see some of the bigger courseware companies going into this area.
RUN: Before we move into specifics with the Commodore market, is there anything that you would like to add?
KH: Pricing. Most of our products fall between $29.95 and $49.95. I think the price is right. This is for both home and school programs.
RUN: What are your future plans for supporting Commodore computers. I'd like you to address both the C-64 and the C-128.
KH: We are going to continue to support the C-64 and the C-128. All the products we now have out are for the Commodore machines. We have some new products coming out, too. We have a new word processor that we'll be announcing in September. Then we have a program called The Works, which contains every major computer application on one disk—keyboarding, word processing, database management, music, graphics, manipulating data, problem-solving and more.

We work very closely with Commodore and want to continue that relationship. All of our programs run on both Apple and Commodore, and about half of them work on IBM.
RUN: Anything specifically coming out for the C-128?
KH: We are in the process of enhancing a C-64 program, The Information Connection, for the 128. And then our word processor will be enhanced for the 128, also.

I think the 128 is a great machine. You get three computers in one: the 64, the 128, and then CP/M. I think *USA Today* said that it was the best computer for under $500. You get a good machine at a low cost.

The nice thing Commodore did when developing the 128 was to make

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sure that all the 64 software ran on the 128. That way you still had some time to see where the 128 was going and what they were doing with it, and your software was still able to run on it. That was good thinking as far as third-party publishers were concerned. So, these publishers didn't have to design new software right away. People are still watching how it is selling.

RUN: So, you'd say that they are taking a cautious approach?

KH: I think publishers are taking a cautious approach when it comes to the C-128. I'm not sure what Commodore's plans are. I think the C-128 is certainly a low-cost alternative to some of the other machines. But I don't see Commodore making major inroads in the education area as yet. So a lot is going to depend on watching how they market it.

RUN: From your contact with teachers and end users, have you seen much interest expressed in the 128?

KH: Well, I've seen interest, but Commodore has a lot of ground to make up. Apple has a huge educational marketing department, as does IBM, but Commodore really doesn't. They have only one or two people, and, although they're excellent people, their competition just has so many more.

In this business, you've got to do a lot of hand-holding. It's who you know; it's going in and talking to a lot of people and being at all the meetings. And if you don't have a big staff, you can't do that.

RUN: In your opinion, what is Commodore's major weakness when it comes to the school market?

KH: Commodore is weak in that it isn't investing enough in its educational marketing. The company is strong in that it has a good-priced product with a lot of performance.

RUN: How closely are you working with Commodore? Are you involved in any joint projects?

KH: We do a lot of work with Commodore. We usually show our products at the company's booths. Commodore sometimes puts out flyers for us. We show Commodore's machines in our catalog. You know, back and forth. We do a lot of work together.

We do co-hospitalities together. We just did one at the American School Administrators (ASA) meeting. Commodore sends us machines for every meeting we attend. If we want to show a 128 with our software, they send us one to use. And that's good. And we share state department information back and forth, and that's helpful.

We are also working with Commodore on the Young Astronaut Program. We just met with Dan Kuntz, the Young Astronaut's launch director, out at ASA, and we're talking about doing something on-line with our encyclopedias in connection with them. We have a lot of projects that we're discussing; we have nothing that we've really announced yet, but there are a lot of possibilities. R

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Education in Canada— A Favorable Climate For Commodores

Here's a look at what our northern neighbors have been doing with Commodore computers in their schools.

By GAIL HOOK

"In spite of difficult price and tariff questions, Canada has been very active in the microcomputer community," states expert Jim Butterfield. Much of this activity has centered in schools. The recent Pepperwood Report credits Commodore with 67% of the Canadian education market, ranging from 26% in Alberta to a whopping 87% in Ontario. As Doug Mortimer, national education manager for Commodore Canada, notes, "The market has eroded slightly, but we still have well over 50%."

Commodore Canada must have done a lot of things right. Its best move may have been to recognize and take advantage of the hotbed of enthusiasm and expertise that sprang up in Toronto as microcomputers came on the market.

Frank Winter, then a teacher at Sheridan College, Oakville (west of metropolitan Toronto), was one of the first to see the potential of computers in education. At the Boston Computer Show in August 1977, Winter ordered two PET computers, prepaid in U.S. funds. Four months later, the machines were delivered to Sheridan College.

Winter remembers, "I had to convince the college vice-president that these machines could teach. My tools were a two-page manual and two programs—one of them blackjack." Sheridan students wrote 116 drills and tests called Micromath. These programs ran on the PETs instead of on rented mainframe terminals. "Within two years, what we had saved on software rental fees paid for 25 more PETs," recalls Winter.

This was a dynamic period, during which in-house workshops became increasingly popular. Before long, Sheridan College was being invited to present microcomputer conferences all over North America, and Commodore equipment was the star attraction. "It was an exciting time," Winter chuckles. "People in the audience would jump to their feet shouting, 'I've done that!' and run up to the front to demonstrate. I believe those workshops generated a lot of computer sales."

At the same time, the Toronto Pet Users' Group (TPUG) was being organized by Lyman Duggan. Its membership list read like a Who's Who of the first Commodore experts: Jim Butterfield, Steve Punter (Wordpro), Brad Templeton (Power/Pal). Butterfield remembers, "Commodore cast a wary eye on us at first, because, traditionally, users' groups had been for complaints."

The company became enthusiastic, however, when TPUG members began producing the thousands of public domain programs now available throughout much of the world. Commodore Canada supported TPUG with equipment and speakers for meetings, and, in return, the TPUG library provided the company with a major argument for selling its computers.

The burgeoning Canadian grassroots movement joined forces with Commodore Canada in March 1982, when Jim Dionne, vice president of sales, hired Frank Winter to cover education. The Three-for-Two Project, where a school bought three microcomputers for the price of two, was already successfully underway. As the third computer was virtually a donation, Commodore actually gave away 15 to 20 million dollars' worth of equipment in this way.

With the advent of the VIC-20 in November 1981, Commodore began mass-merchandising. Schools were pleased to acquire inexpensive student workstations, and some colleges bought VICs as keyboards for business training.

Consumers rushed to take home the latest high-tech toy. Those at Commodore Canada, however, worried that many had bought on impulse, with no idea of how to use a microcomputer. VICs were in danger of becoming high-tech closet stuffers.

The VIC Project addressed this concern, and, at the same time, sup-

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plied thousands of VICs to schools. Educational institutions were offered as many as 40 VIC-20s each at a mere 11% of the original list price. Schools could use them during the day with the understanding that they be available to the general public during evening classes. About 150 centers were set up across Canada.

At this time, hardware was evolving rapidly; numerous small changes made it difficult to transfer programs from machine to machine. In response to customer frustration, Dionne and Winter instituted the Ontario Software Project.

Consultants, teachers and people from the Ontario Ministry of Education worked together to collect public domain software. Student programmers rewrote programs to a standardized format that included student and teacher instructions. The 1200 programs were then classified by subject and grade level and indexed for easy use.

In September 1982, 8000 disks were distributed to 30 school boards that had contributed programs. Each board was encouraged to make copies for its teachers. Some programs were excellent, ready to be included in lessons; others were less polished. But all were starting points, available for teachers to adapt to their own purposes.

By this time, many Canadian educators had been convinced of the worth of computers in education. They were particularly eager to do word processing, but computers with enough memory for this task were still expensive. Then, in September 1982, the Commodore 64 arrived to supply that memory economically—and with the lure of special music and graphics capabilities thrown in. Today, as much as 90% of microcomputer use in elementary and secondary schools is for word processing.

The C-64's Canadian debut was not auspicious. Frank Winter recalls, "I took home the first and only C-64 in Canada. In my ignorance, I stuck a digital-to-analog converter into the back and blew it up. As I was wondering how I was going to tell everyone I had fried our only C-64, I discovered I had just blown a fuse."

Once the shock wore off, the education staff began promoting the C-64s. Each year, salespeople were given an intensive training course, then sent, along with three or four computers and some software, to visit every major school board in Canada. The teachers were given the opportunity to try the computers and programs for two weeks. "You can talk all you want, but there's nothing like giving people the chance to do things themselves," says Winter.

This down-to-earth approach can be credited with much of Commodore Canada's success in the field of education. Winter and district representatives Gord McOrmand, Laurie Fountain and Yvon Husereau all were educators before joining Commodore Canada. Winter believes this gave them a great advantage because "teachers were confident that we knew what we were talking about."

After-sales support is a big selling point, too. During the early years, a quarterly newsletter providing education news and updates on equipment and prices was sent to all Canadian schools. Under Doug Mortimer, Commodore Canada continues to provide speakers and guest experts such as Jim Butterfield for education conferences across Canada.

The company has also recently become involved in Young Astronauts (Canada), a club that promotes science, math and technology skills. Commodore Canada will help the club purchase equipment and will distribute the programs it produces.

As many newspapers and magazines will tell you, however, the microcomputer revolution is over. Some experts predict that schools will pull back on hardware purchases and concentrate instead on developing software to fit their curricula. Can the Commodore success story in Canada's education market continue?

Mortimer believes it can: "We've just completed an excellent quarter. Teachers still feel that the 64 provides a lot of machine for the money. And we've had a lot of interest in the 128s."

Much of Commodore's Canadian success stems from enthusiastic employees, a clear focus on the potential of the education market and a concrete approach to customer needs. A company that has sold over five million C-64s worldwide can afford to be optimistic. R

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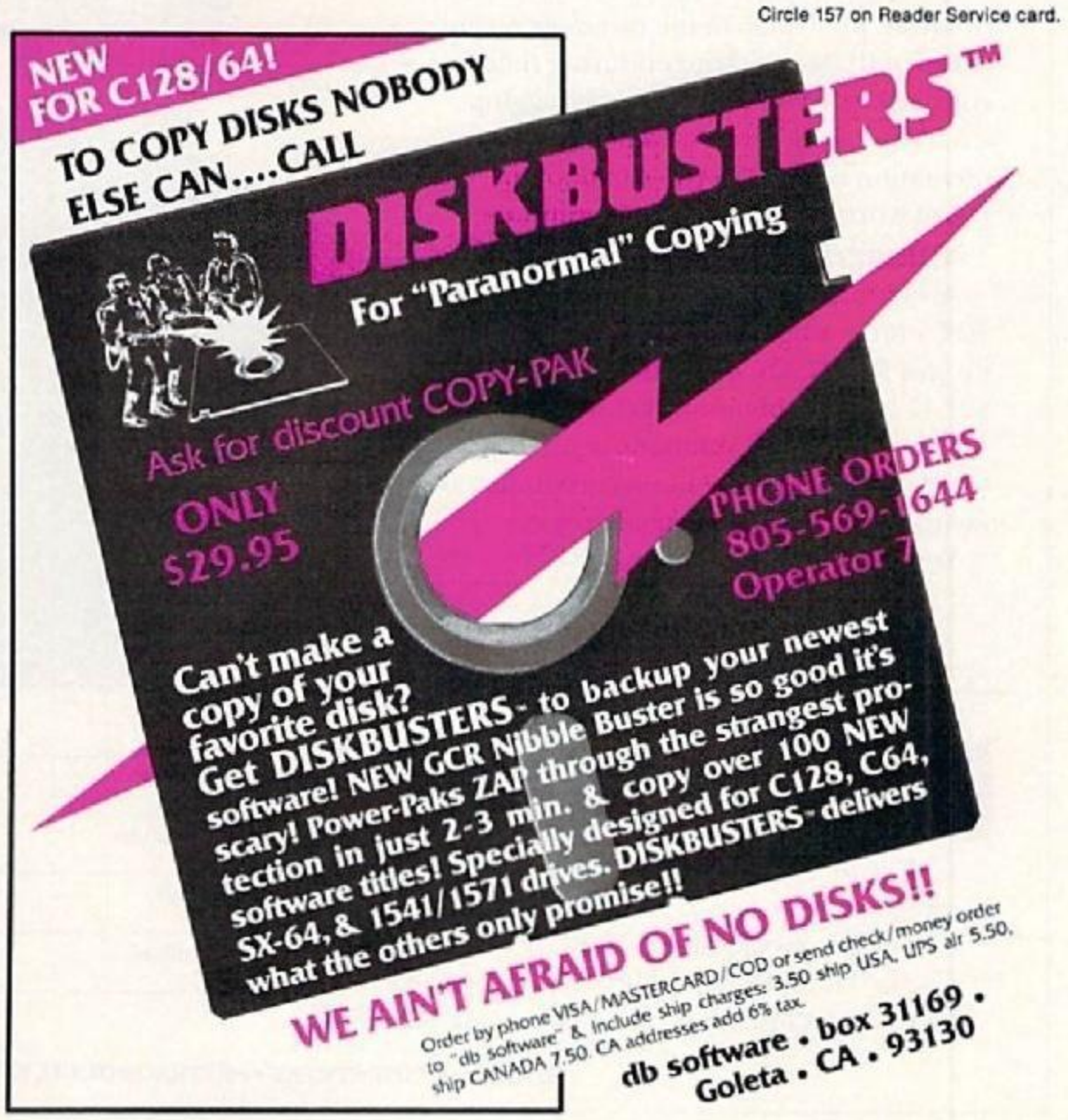
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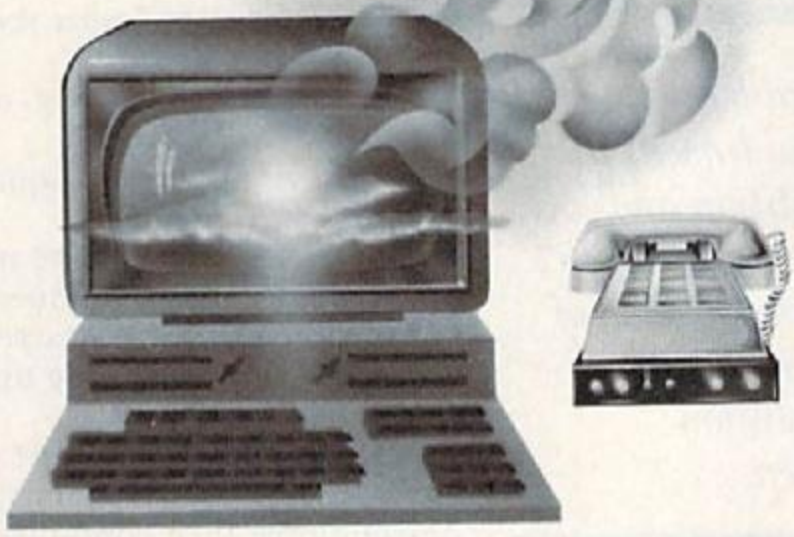

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Arithme-Sketch

By JAMES PELLECHI

Arithme-Sketch combines arithmetic and drawing in a unique way. The menu prompts you to select addition or subtraction and then a grade level from 1–5. The first-grade level selects problems with one-digit numbers, the second-grade level two-digit numbers, and so on.

The program displays a sheet of wide-lined paper on a clipboard. Each problem appears on the paper in large block numbers. Sound and visual effects accompany answers. After five problems have been answered, the program moves to the drawing screen.

Drawing is done with a joystick plugged into port 2. The amount of time allotted for drawing depends on how many problems were answered correctly; each correct answer earns one minute of drawing time. The time remaining is displayed at the top of the screen, and when it runs out, your artwork is saved in memory, and the clipboard displaying the main menu appears for another round of math.

This program gives children a grand time as they practice addition and subtraction, and every correct answer earns one minute of drawing time on the low-resolution screen.

While in Drawing mode, you may use the following keys or combinations thereof.

Joystick fire-button—Pressing the button turns a square on. Releasing the button allows you to move the cursor anywhere on the screen.

Numbers 1–8—Selects one of eight drawing colors.

Shift—Erases whatever square the cursor is currently on.

F1 key—Saves the screen to memory; drawing time then continues.

F2 key—Replaces current screen with screen last saved; drawing time then continues.

CTRL-f1—Erases current screen (saved screen remains unchanged); drawing time then continues.

Shift Lock—Automatically erases individual squares on the screen as the cursor is moved by the joystick.

CTRL-logo—Aborts Drawing mode; saves final screen to memory; returns to menu. R

Address all author correspondence to James Pellechi, 269 Pinecone St., Middle Island, NY 11953.

Listing 1. *Arithme-Sketch program.*

```
1Ø PRINTCHR$(142):GOTO56Ø:REM*86
3Ø REM ARITHME-SKETCH BY TED JEA
   N & JIM PELLECHI      :REM*14Ø
8Ø REM RIGHT ANSWER       :REM*92
9Ø POKEV,15:FORTT=1TO3:POKED,1Ø:
   POKER,64+11:POKESU,23:POKES1,
   23:POKEU,4             :REM*216
1ØØ POKEW,21:FORT=1TO5Ø:NEXT:POK
   EW,2Ø                  :REM*168
11Ø FORT=1TO16:POKE5328Ø,PEEK(53
   28Ø)+1AND15:NEXT:NEXT:POKE53
   28Ø,14:RETURN          :REM*14
12Ø : KEY PRESSED         :REM*32
13Ø POKEV,15:POKEU,11Ø:POKED,15:
   POKER,9:POKEW,17:FORT=1TO9Ø:
   NEXT:POKEV,Ø           :REM*162
14Ø FORT=ØTO24:POKEB+T,Ø:NEXT:RE
   TURN                   :REM*182
15Ø : WRONG ANSWER        :REM*164
16Ø POKE5328Ø,9:FORTT=1TO25:POKE
   V,1Ø                   :REM*18Ø
17Ø FORT=1TO3:NEXT:POKEV,Ø:FORI=
   1TO3:NEXT:NEXT:POKE5328Ø,14:
   RETURN                 :REM*244
18Ø REM LARGE NUMBERS     :REM*216
19Ø ON(A+1) GOSUB2ØØ,21Ø,22Ø,23Ø
   ,24Ø,25Ø,26Ø,27Ø,28Ø,29Ø:PRI
   NTCHR$(29);:RETURN     :REM*218
2ØØ PRINT"{CTRL 9} {CRSR LF}{CRS
   R UP} {CRSR LF}{CRSR UP}{3 S
   PACEs}{CRSR LF}{CRSR DN} {CR
   SR LF}{CRSR DN} {CRSR LF}{CR
   SR DN} {CRSR LF}{CRSR DN} {2
    CRSR LFs} {2 CRSR LFs} {CRS
   R LF}{CRSR UP} {2 CRSR RTs}{
   CRSR UP}";:RETURN: Ø:REM*156
21Ø PRINT"{CTRL 9}{2 CRSR UPs}{C
   RSR RT} {CRSR LF}{CRSR DN} {
   CRSR LF}{CRSR DN} {CRSR LF}{
   CRSR DN} {CRSR LF}{CRSR DN}
   {2 CRSR UPs}{CRSR RT}";:RETU
   RN: 1                  :REM*56
22Ø PRINT"{CTRL 9}{2 CRSR UPs}{3
    SPACEs}{CRSR LF}{CRSR DN} {
   CRSR LF}{CRSR DN} {2 CRSR LF
   s} {2 CRSR LFs} {CRSR LF}{CR
   SR DN} {CRSR LF}{CRSR DN}{3
   SPACEs}{2 CRSR UPs}";:RETURN
   : 2                    :REM*74
23Ø PRINT"{CTRL 9}{2 CRSR UPs}{3
    SPACEs}{CRSR LF}{CRSR DN} {
   CRSR LF}{CRSR DN} {2 CRSR LF
   s} {2 CRSR LFs} {CRSR LF}{2
   CRSR DNs}{3 SPACEs}{CRSR LF}
   {CRSR UP} {CRSR UP}";:RETURN
   : 3                    :REM*8Ø
24Ø PRINT"{CTRL 9}{2 CRSR UPs} {
   CRSR LF}{CRSR DN} {CRSR LF}{
   CRSR DN}{3 SPACEs}{2 CRSR UP
   s}{CRSR LF} {CRSR LF}{CRSR D
   N} {CRSR LF}{2 CRSR DNs} {CR
   SR LF}{CRSR DN} {2 CRSR UPs}
   ";:RETURN: 4           :REM*138
25Ø PRINT"{CTRL 9}{2 CRSR UPs}{3
    SPACEs}{3 CRSR LFs}{CRSR DN
```

→

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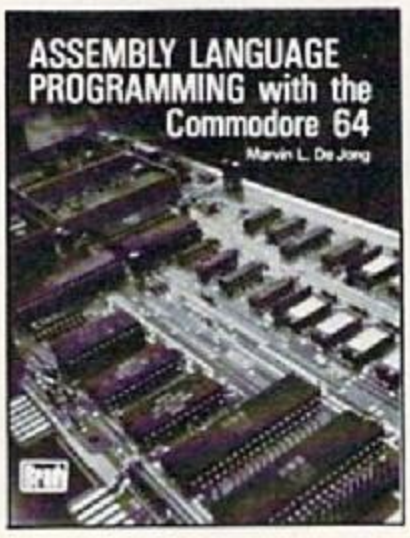

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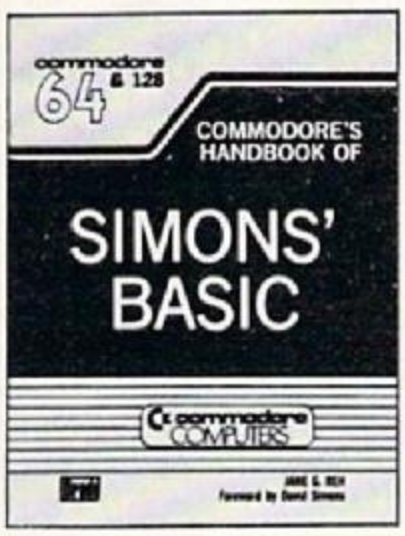

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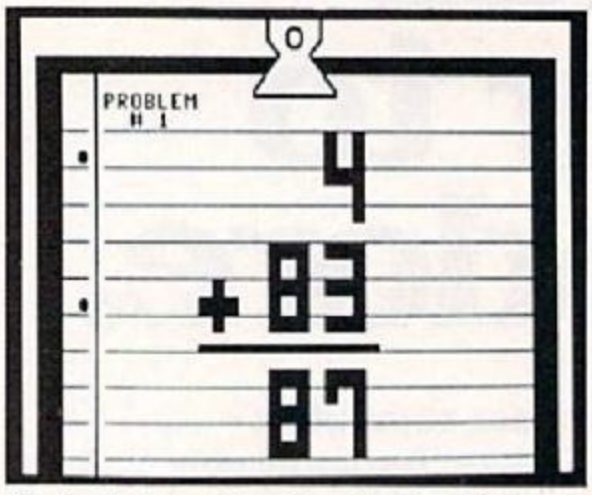

Photo 1. Example of vertical addition in Arithme-Sketch program.

Listing 1 continued.

```
    } {CRSR LF}{CRSR DN}{3 SPACE
    s}{CRSR LF}{CRSR DN} {3 CRSR
     LFs}{CRSR DN}{3 SPACEs}{2 C
    RSR UPs}";:RETURN: 5   :REM*4
26Ø PRINT"{CTRL 9}{2 CRSR UPs} {
    CRSR LF}{CRSR DN} {CRSR LF}{
    CRSR DN}{3 SPACEs}{3 CRSR LF
    s}{CRSR DN} {CRSR LF}{CRSR D
    N}{3 SPACEs}{CRSR UP}{CRSR L
    F} {CRSR UP}";:RETURN: 6
                              :REM*95
27Ø PRINT"{CTRL 9}{CRSR UP} {CRS
    R LF}{CRSR UP}{3 SPACEs}{CRS
    R LF}{CRSR DN} {CRSR LF}{CRS
    R DN} {CRSR LF}{CRSR DN} {CR
    SR LF}{CRSR DN} {2 CRSR UPs}
    ";:RETURN: 7           :REM*233
28Ø PRINT"{CTRL 9} {CRSR LF}{CRS
    R UP} {CRSR LF}{CRSR UP}{3 S
    PACEs}{CRSR LF}{CRSR DN} {CR
    SR LF}{CRSR DN} {CRSR LF}{CR
    SR DN} {CRSR LF}{CRSR DN} {2
     CRSR LFs} {2 CRSR LFs} {CRS
    R LF}{CRSR UP} {CRSR UP} {CR
    SR RT}";:RETURN: 8  :REM*115
29Ø PRINT"{CTRL 9} {CRSR LF}{CRS
    R UP} {CRSR LF}{CRSR UP}{3 S
    PACEs}{CRSR LF}{CRSR DN} {CR
    SR LF}{CRSR DN} {CRSR LF}{CR
    SR DN} {CRSR LF}{CRSR DN} {2
     CRSR LFs} {2 CRSR LFs} {2 C
    RSR UPs} {CRSR RT}";:RETURN:
     9                        :REM*11
3ØØ ON GL GOTO31Ø,32Ø,33Ø,34Ø,35
    Ø                         :REM*243
31Ø S=8:SL=15:LL= 8:RETURN:REM*9
32Ø S=6:SL=13:LL=12:RETURN
                              :REM*239
33Ø S=4:SL=12:LL=15:RETURN
                              :REM*217
34Ø S=2:SL=1Ø:LL=19:RETURN
                              :REM*191
35Ø S=Ø:SL= 8:LL=23:RETURN
                              :REM*141
36Ø REM CLIPBOARD             :REM*35
37Ø POKE5328Ø,14:POKE53281,7
                              :REM*85
38Ø PRINT"{HOME}{COMD 2}{18 SPAC
    Es}{COMD H}{SHFT U}{SHFT I}{
    COMD N}{18 SPACEs}";:REM*251
39Ø PRINT"{18 SPACEs}{SHFT M}{SH
    FT J}{SHFT K}{SHFT N}{18 SPA
    CEs}";                    :REM*85
4ØØ PRINT" {CTRL 9}{17 SPACEs}{C
    TRL Ø}{SHFT LB.}{2 SPACEs}{C
    OMD *}{CTRL 9}{17 SPACEs}{CT
    RL Ø}"                    :REM*227
41Ø PRINT" {CTRL 9}{2 SPACEs}{CT
    RL Ø}{2 SPACEs}{CTRL 3}{SHFT
     -}{COMD 2}{11 SPACEs}{SHFT
    N}{4 SPACEs}{SHFT M}{14 SPAC
    Es}{CTRL 9}{2 SPACEs}"
                              :REM*115
42Ø PRINT" {CTRL 9}{2 SPACEs}{CT
    RL Ø}{2 SPACEs}{CTRL 3}{SHFT
     -}{COMD 2}{11 SPACEs}{6 COM
    D Ys}{14 SPACEs}{CTRL 9}{2 S
    PACEs}{CRSR UP}":FORA=ØTO9
                              :REM*249
43Ø PRINT"{CRSR DN} {CTRL 9}{2 S
    PACEs}{CTRL Ø}{2 SPACEs}{CTR
    L 3}{SHFT -}{COMD 2}{31 SPAC
    Es}{CTRL 9}{2 SPACEs}"
                              :REM*1Ø9
44Ø PRINT" {CTRL 9}{2 SPACEs}{CT
    RL Ø}{CTRL 7}{2 COMD Ts}{CTR
    L 3}{SHFT -}{CTRL 7}{31 COMD
     Ts}{COMD 2}{CTRL 9}{2 SPACE
    s}{CRSR UP}":NEXT     :REM*131
45Ø FORA=13Ø8TO1948STEP32Ø:POKEA
    ,81:NEXT:RETURN       :REM*123
46Ø REM TITLE SCREEN      :REM*237
47Ø GOSUB37Ø               :REM*33
48Ø PRINT LINE$(8)SPC(14)"ARITHM
    E-SKETCH"             :REM*255
49Ø PRINT LINE$(9)SPC(14);
                          :REM*1Ø7
5ØØ FOR A=1TO14:PRINT CHR$(183);
    :NEXT                 :REM*81
51Ø PRINT LINE$(12)SPC(1Ø)"WHAT
    KIND OF PROBLEMS ?"   :REM*191
52Ø PRINT LINE$(16)SPC(7)"PRESS{
    2 SPACEs}+{2 SPACEs}FOR ADDI
    TION"                 :REM*176
53Ø PRINT LINE$(18)SPC(7)"PRESS{
    2 SPACEs}-{2 SPACEs}FOR SUBT
    RACTION"              :REM*158
54Ø PRINT LINE$(22)SPC(12)"YOUR
    CHOICE ";:RETURN      :REM*17Ø
55Ø REM CURSOR CONTROL    :REM*174
56Ø DIM LINE$(25)          :REM*26
57Ø LINE$(1)=CHR$(19)     :REM*12Ø
58Ø FOR A=2TO25           :REM*66
59Ø LINE$(A)=LINE$(A-1)+CHR$(17)
    :NEXT                  :REM*6
6ØØ REM CONSTANTS         :REM*56
61Ø ZZ=1:SC=1Ø65:CO=54272:CL=Ø
                          :REM*92
62Ø REM JOYSTICK TABLE    :REM*2Ø6
63Ø FOR A=ØTO1Ø:READ XY(A):NEXT
                          :REM*192
64Ø DATA Ø,-4Ø,4Ø,Ø,-1,-41
                          :REM*164
65Ø DATA 39,Ø,1,-39,41     :REM*8
66Ø REM KEYBOARD TABLE    :REM*146
67Ø DIM KEY(64)           :REM*64
68Ø FOR A=ØTO64:KEY(A)=Ø:NEXT
                          :REM*192
69Ø KEY(Ø8)=11:KEY(11)=15:KEY(16
    )=5                   :REM*66
7ØØ KEY(19)=6:KEY(24)=7:KEY(27)=
    8                     :REM*192
71Ø KEY(56)=1:KEY(59)=2   :REM*24
72Ø REM ML                :REM*62
73Ø AD=49152              :REM*54
74Ø READ A:IFA<>-1THENPOKEAD,A:A
    D=AD+1:GOTO74Ø        :REM*142
75Ø DATA 162,4,16Ø,196,32,3Ø,192
                          :REM*2Ø2
76Ø DATA 162,216,16Ø,2ØØ,32,3Ø
                          :REM*5Ø
77Ø DATA 192,96,162,196,16Ø,4
                          :REM*81
78Ø DATA 32,3Ø,192,162,2ØØ,16Ø
                          :REM*57
79Ø DATA 216,32,3Ø,192,96
                          :REM*215
8ØØ DATA 142,42,192,14Ø,45,192
                          :REM*229
81Ø DATA 16Ø,4,162,Ø,189,Ø,Ø
                          :REM*93
82Ø DATA 157,Ø,Ø,2Ø2,2Ø8,247
                          :REM*119
83Ø DATA 238,42,192,238,45,192
                          :REM*133
84Ø DATA 136,2Ø8,238,96,-1
                          :REM*149
85Ø REM SOUND             :REM*129
86Ø B=54272:FORT=ØTO24:POKEB+T,Ø
    :NEXT                 :REM*117
87Ø V=B+24:W=B+4:U=B+1:D=B+5:R=B
    +6:S1=B+14:SU=B+15     :REM*23
88Ø REM DISPLAY TITLE     :REM*189
89Ø PRINT"{SHFT CLR}":GOSUB47Ø:P
    OKE198,Ø              :REM*145
9ØØ PRINT"?"CHR$(149)CHR$(157);:
    IF PEEK(162)AND32 THEN PRINT
    CHR$(158);            :REM*81
91Ø GETAN$:IFAN$<>"+"ANDAN$<>"-"
    THEN9ØØ               :REM*31
92Ø PRINTCHR$(149)AN$:GOSUB13Ø:F
    OR A=1TO5ØØ:NEXT      :REM*43
93Ø REM DIFFICULTY LEVEL:REM*213
94Ø GOSUB37Ø              :REM*249
95Ø PRINT LINE$(6)SPC(11)"SELECT
     GRADE LEVEL"         :REM*1Ø7
96Ø PRINT LINE$(1Ø)SPC(11)CHR$(1
    8)"1"SPC(5)CHR$(146)" FIRST
    GRADE"                :REM*89
97Ø PRINT LINE$(12)SPC(11)CHR$(1
    8)"2"SPC(5)CHR$(146)"SECOND
    GRADE"                :REM*1Ø5
98Ø PRINT LINE$(14)SPC(11)CHR$(1
    8)"3"SPC(5)CHR$(146)" THIRD
    GRADE"                :REM*245
99Ø PRINT LINE$(16)SPC(11)CHR$(1
    8)"4"SPC(5)CHR$(146)"FOURTH
    GRADE"                :REM*49
1ØØØ PRINT LINE$(18)SPC(11)CHR$(
    18)"5"SPC(5)CHR$(146)" FIFT
    H GRADE"              :REM*93
1Ø1Ø PRINT LINE$(24)SPC(9)"PICK
    ANY GRADE"CHR$(149)"{2 SPAC
    Es}1 - 5"             :REM*243
1Ø2Ø IFPEEK(162)AND32THENPRINTCH
    R$(158);              :REM*169
1Ø3Ø GETA$:ON-(A$<"1"ORA$>"5"ORA
    $="")GOTO1Ø1Ø:GOSUB13Ø
                          :REM*22Ø
1Ø4Ø NN=1Ø{UP ARROW}(VAL(A$))-1:
    MM=NN                 :REM*44
1Ø5Ø :                     :REM*6
1Ø6Ø REM INSTRUCTIONS     :REM*72
1Ø7Ø GOSUB37Ø             :REM*124
1Ø8Ø PRINT LINE$(8)SPC(1Ø)"YOU W
    ILL NOW GET 5"        :REM*4
1Ø9Ø PRINT LINE$(1Ø)SPC(1Ø)CHR$(
    18);                  :REM*44
11ØØ IFAN$="+"THEN PRINT"ADDITIO
    N PROBLEMS.":GOTO112Ø
                          :REM*144
111Ø PRINT"SUBTRACTION PROBLEMS.
    "                     :REM*5Ø
112Ø PRINT LINE$(12)SPC(1Ø)"FOR
    EVERY RIGHT ANSWER,":REM*72
113Ø PRINT LINE$(14)SPC(1Ø)"YOU
    WILL GET 1 MINUTE"  :REM*16Ø
114Ø PRINT LINE$(16)SPC(1Ø)"OF D
    RAWING TIME."         :REM*34
115Ø PRINT LINE$(2Ø)SPC(15);
                          :REM*8Ø
116Ø FOR A=1TO11:PRINT CHR$(175)
    ;:NEXT                :REM*166
117Ø PRINT LINE$(21)SPC(15)CHR$(
    18)" GOOD LUCK "      :REM*15Ø
118Ø PRINT LINE$(22)SPC(15);
                          :REM*118
119Ø FOR A=1TO11:PRINT CHR$(163)
    ;:NEXT:POKE198,Ø       :REM*82
12ØØ PRINT LINE$(24)SPC(8)"PRESS
     "                    :REM*24
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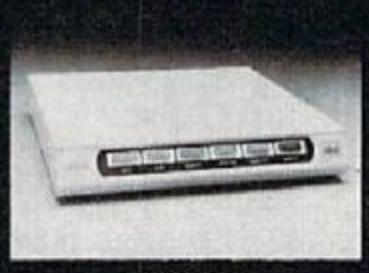

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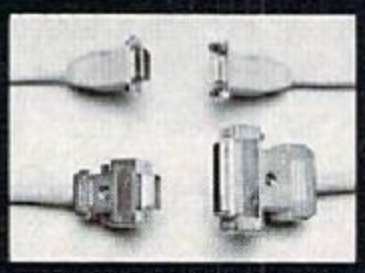

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Listing 1 continued.

```
121Ø PRINT LINE$(24)SPC(14)"ANY
     KEY"CHR$(149)" TO CONTINUE"
                          :REM*66
122Ø IFPEEK(162)AND32THENPRINTCH
     R$(158);             :REM*114
123Ø GETA$:ON-(A$="")GOTO121Ø:GO
     SUB13Ø               :REM*178
124Ø REM BEGIN MATH       :REM*7Ø
125Ø PROB=1:TL=Ø:POKE198,Ø
                          :REM*138
126Ø GOSUB19ØØ:TRY=Ø      :REM*1Ø8
127Ø GOSUB37Ø             :REM*68
128Ø REM MATH PROBLEMS    :REM*179
129Ø PRINT LINE$(Ø5)SPC(6)"PROBL
     EM"SPC(35)"#"PROB:GOSUB3ØØ
                          :REM*111
13ØØ PRINTLINE$(Ø9)SPC(12)SPC((G
     L-LN)*4+S);          :REM*61
131Ø ON LN GOTO137Ø,136Ø,135Ø,13
     4Ø,133Ø,132Ø         :REM*141
132Ø A=N(1):GOSUB19Ø      :REM*123
133Ø A=N(2):GOSUB19Ø      :REM*197
134Ø A=N(3):GOSUB19Ø       :REM*15
135Ø A=N(4):GOSUB19Ø       :REM*91
136Ø A=N(5):GOSUB19Ø      :REM*165
137Ø A=N(6):GOSUB19Ø      :REM*239
138Ø PRINTLINE$(15)SPC(12)SPC((G
     L-LM)*4+S);          :REM*63
139Ø ON LM GOTO145Ø,144Ø,143Ø,14
     2Ø,141Ø,14ØØ         :REM*59
14ØØ A=M(1):GOSUB19Ø      :REM*187
141Ø A=M(2):GOSUB19Ø        :REM*5
142Ø A=M(3):GOSUB19Ø       :REM*79
143Ø A=M(4):GOSUB19Ø      :REM*155
144Ø A=M(5):GOSUB19Ø      :REM*229
145Ø A=M(6):GOSUB19Ø      :REM*47
146Ø PRINTLINE$(16)SPC(SL);
                          :REM*167
147Ø IF AN$="+"THEN PRINT"{3 SPA
     CEs}{2 CRSR LFs}{CRSR UP} {
     CRSR LF}{2 CRSR DNs} ":GOTO
     149Ø                 :REM*1Ø5
148Ø PRINT "{2 COMD Ps}":REM*189
149Ø PRINTLINE$(18)SPC(SL);
                          :REM*2Ø5
15ØØ FOR A=ØTO LL:PRINT CHR$(185
     );:NEXT              :REM*195
151Ø PRINT LINE$(22)SPC((SL+LL)-
     2);                  :REM*35
152Ø GOSUB2Ø5Ø:REM DIGIT 1
                          :REM*115
153Ø ANS=VAL(A$)          :REM*183
154Ø IF N3<1Ø THEN169Ø    :REM*1Ø4
155Ø GOSUB2Ø5Ø:REM DIGIT 2
                          :REM*21Ø
156Ø ANS=ANS+(VAL(A$)*1Ø)
                          :REM*114
157Ø IF N3<1ØØ THEN169Ø  :REM*1Ø2
158Ø GOSUB2Ø5Ø:REM DIGIT 3
                          :REM*48
159Ø ANS=ANS+(VAL(A$)*1ØØ)
                          :REM*9Ø
16ØØ IF N3<1ØØØ THEN169Ø :REM*68
161Ø GOSUB2Ø5Ø:REM DIGIT 4
                          :REM*144
162Ø ANS=ANS+(VAL(A$)*1ØØØ)
                          :REM*16
163Ø IF N3<1ØØØØ THEN169Ø
                          :REM*224
164Ø GOSUB2Ø5Ø:REM DIGIT 5
                          :REM*238
165Ø ANS=ANS+(VAL(A$)*1ØØØØ)
                          :REM*88
166Ø IF N3<1ØØØØØ THEN169Ø
                          :REM*252
167Ø GOSUB2Ø5Ø:REM DIGIT 6
                          :REM*76
168Ø ANS=ANS+(VAL(A$)*1ØØØØØ)
                          :REM*2Ø4
169Ø PRINTCHR$(18);:IF N3=ANS TH
     EN177Ø               :REM*124
17ØØ GOSUB16Ø:TRY=TRY+1:IF TRY=2
      THEN173Ø            :REM*Ø
171Ø PRINT LINE$(1)SPC(3)"INCORR
     ECT !!"SPC(11)" TRY AGAIN "
                          :REM*2
172Ø FOR A=1TO2ØØØ:NEXT:GOTO127Ø
                          :REM*8Ø
173Ø PRINT LINE$(1)SPC(2)"WRONG
     AGAIN ..."SPC(6)" THE ANSWE
     R IS "               :REM*16Ø
174Ø PRINTLINE$(2)SPC(24);:IFGL<
     4THENPRINT" ";:IFGL=1THENPR
     INT" ";              :REM*58
175Ø PRINT"*** "MID$(STR$(N3),2)
     " ***"               :REM*8Ø
176Ø GOTO179Ø             :REM*62
177Ø TL=TL+1              :REM*246
178Ø PRINT LINE$(1)SPC(4)" EXCEL
     LENT "SPC(1Ø)" ANSWER !!!":
     GOSUB9Ø              :REM*15Ø
179Ø PRINTCHR$(146):FOR A=1TO14Ø
     Ø:NEXT               :REM*138
18ØØ PROB=PROB+1:IF PROB<6 THEN1
     26Ø                  :REM*149
181Ø POKE5328Ø,14:POKE53281,2
                          :REM*211
182Ø POKE646,1:PRINT CHR$(147)
                          :REM*173
183Ø PRINT LINE$(6)SPC(1Ø)"YOU G
     OT "TL" RIGHT!"      :REM*69
184Ø PRINT LINE$(9)SPC(8)"NOW IT
      IS TIME TO DRAW." :REM*2Ø3
185Ø PRINT LINE$(16)SPC(8)"USE J
     OYSTICK IN CONTROL":REM*249
186Ø PRINT LINE$(18)SPC(15)"PORT
      # 2"               :REM*37
187Ø FOR A=1TO4ØØØ:NEXT   :REM*69
188Ø GOTO211Ø             :REM*93
189Ø REM RANDOM NUMBERS :REM*133
19ØØ FORX=1TO6:N(X)=-1:NEXT
                          :REM*181
191Ø FORX=1TO6:M(X)=-1:NEXT
                          :REM*189
192Ø N=INT((RND(Ø)* NN)+1):REM*5
193Ø M=INT((RND(Ø)* MM)+1)
                          :REM*219
194Ø IF AN$="+"THEN N3=N+M:GOTO1
     98Ø                   :REM*7
195Ø IF N=M THEN193Ø      :REM*253
196Ø IF N<M THEN N3=N:N=M:M=N3
                          :REM*33
197Ø N3=N-M               :REM*19
198Ø N1$=STR$(N):LN=LEN(N1$)-1
                          :REM*247
199Ø X=1:FORA=(7-LN)TO6:N(A)=VAL
     (MID$(N1$,X+1,1)):X=X+1:NEX
     T                    :REM*87
2ØØØ M1$=STR$(M):LM=LEN(M1$)-1
                          :REM*247
2Ø1Ø X=1:FORA=(7-LM)TO6:M(A)=VAL
     (MID$(M1$,X+1,1)):X=X+1:NEX
     T                    :REM*63
2Ø2Ø IF LN-LM<ØTHEN GL=LM:RETURN
                          :REM*167
2Ø3Ø GL=LN:RETURN         :REM*1Ø7
2Ø4Ø REM GET DIGIT         :REM*55
2Ø5Ø POKE198,Ø            :REM*178
2Ø6Ø PRINT"?"CHR$(149)CHR$(157);
     :IFPEEK(162)AND32THENPRINTC
     HR$(158);            :REM*222
2Ø7Ø GETA$:IFA$<"Ø"ORA$>"9"THEN2
     Ø6Ø                  :REM*238
2Ø8Ø A=VAL(A$):PRINTCHR$(158)CHR
     $(16Ø)CHR$(149)CHR$(157)CHR
     $(157);:GOSUB19Ø     :REM*252
2Ø9Ø FORA=ØTO6:PRINT CHR$(157);:
     NEXT:GOSUB13Ø:RETURN
                          :REM*1Ø8
21ØØ REM                  :REM*122
211Ø REM DRAW ROUTINE      :REM*22
212Ø PRINT CHR$(151);CHR$(147);
                          :REM*188
213Ø POKE5328Ø,8:POKE53281,15
                          :REM*156
214Ø IF ZZ=Ø THENSYS(49167):GOTO
     22ØØ                 :REM*182
215Ø PRINTCHR$(18)"%%%%%%%%%%%%
      TIME ={8 SPACEs}%%%%%%%%%%
     %%%";                :REM*2Ø8
216Ø FORX=1TO23:PRINTSPC(38)"%%"
     ;:NEXT               :REM*12Ø
217Ø PRINT"%%% F1= SAVE %%%%%%%%
     % F2= RESTORE %%%"CHR$(157)
     CHR$(148)"%"CHR$(19):REM*94
218Ø ZZ=Ø:IFER=1THEN SC=1Ø65:ER=
     Ø:RETURN              :REM*198
219Ø SYS(49152)            :REM*4Ø
22ØØ TIME$="ØØØØØØ"         :REM*8
221Ø T2$=MID$(TIME$,4,1):REM*162
222Ø T3$=MID$(TIME$,5,2):REM*244
223Ø T2=TL-VAL(T2$)-1      :REM*38
224Ø T3=59-VAL(T3$)        :REM*2Ø
225Ø T3$=STR$(T3):IFT3<1ØTHENT3$
     =" Ø"+RIGHT$(T3$,1) :REM*54
226Ø PRINT LINE$(1)SPC(2Ø)CHR$(1
     8)T2":"T3$           :REM*192
227Ø IF T2<ØTHEN25ØØ       :REM*14
228Ø JV=PEEK(5632Ø):KV=PEEK(197)
     :SV=PEEK(653)         :REM*48
229Ø FB=16-(JV AND 16):JV=15-(JV
      AND 15)              :REM*172
23ØØ CH=PEEK(SC):CC=PEEK(SC+CO)
                          :REM*42
231Ø IF CH>127THEN POKESC,171:GO
     TO233Ø               :REM*157
232Ø POKE SC,43:POKE SC+CO,CL
                          :REM*29
233Ø FOR A=1TO5Ø:NEXT     :REM*247
234Ø POKE SC,CH:POKE SC+CO,CC
                          :REM*1Ø7
235Ø FOR A=1TO5Ø:NEXT      :REM*11
236Ø IF FB THENPOKE SC,16Ø:POKE
     SC+CO,CL             :REM*151
237Ø IFKEY(KV) THEN CL=KEY(KV)-1
                          :REM*2Ø7
238Ø IF SV=1 AND KV<>4 THEN POKE
      SC,32               :REM*19
239Ø IFKV<>4THEN245Ø      :REM*211
24ØØ IFSV=1THENGOSUB13Ø:SYS(4916
     7):GOTO245Ø:REM F2 KEY
                          :REM*133
241Ø IFSV=4THENER=1:ZZ=1:GOSUB21
     2Ø:REM{2 SPACEs}CONTROL KEY
     /F1 KEY (ERASE SCREEN)
                          :REM*235
242Ø IF SV THEN245Ø       :REM*219
243Ø GOSUB13Ø:SYS(49152):PRINTCH
     R$(147)LINE$(12)SPC(15)"S A
      V E D"              :REM*21
244Ø FORA=1TO999:NEXT:SYS(49167)
                          :REM*189
245Ø SC=SC+XY(JV):IF SV=6 THEN 2
     5ØØ:REM CONTROL KEY/LOGO KE
     Y (EXIT DRAW)        :REM*229
246Ø IF(SC<1Ø65)OR(SC>1982)THEN
     SC=SC-XY(JV)         :REM*237
247Ø IF(SC-1Ø64)/4Ø=INT((SC-1Ø64
     )/4Ø)THEN SC=SC-XY(JV)
                          :REM*43
248Ø IF(SC-1Ø63)/4Ø=INT((SC-1Ø63
     )/4Ø)THEN SC=SC-XY(JV)
                          :REM*47
249Ø GOTO221Ø             :REM*2Ø9
25ØØ GOSUB9Ø:SYS(49152):PRINTCHR
     $(147):GOTO89Ø       :REM*97
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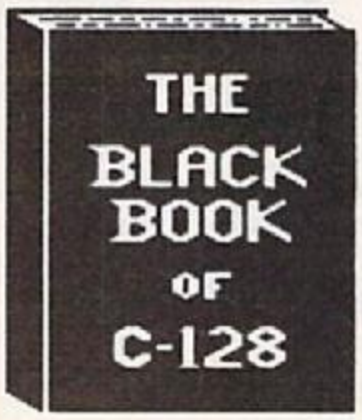

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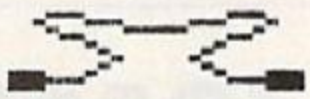

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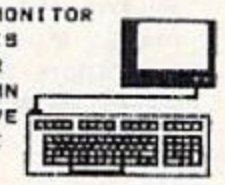

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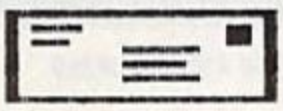

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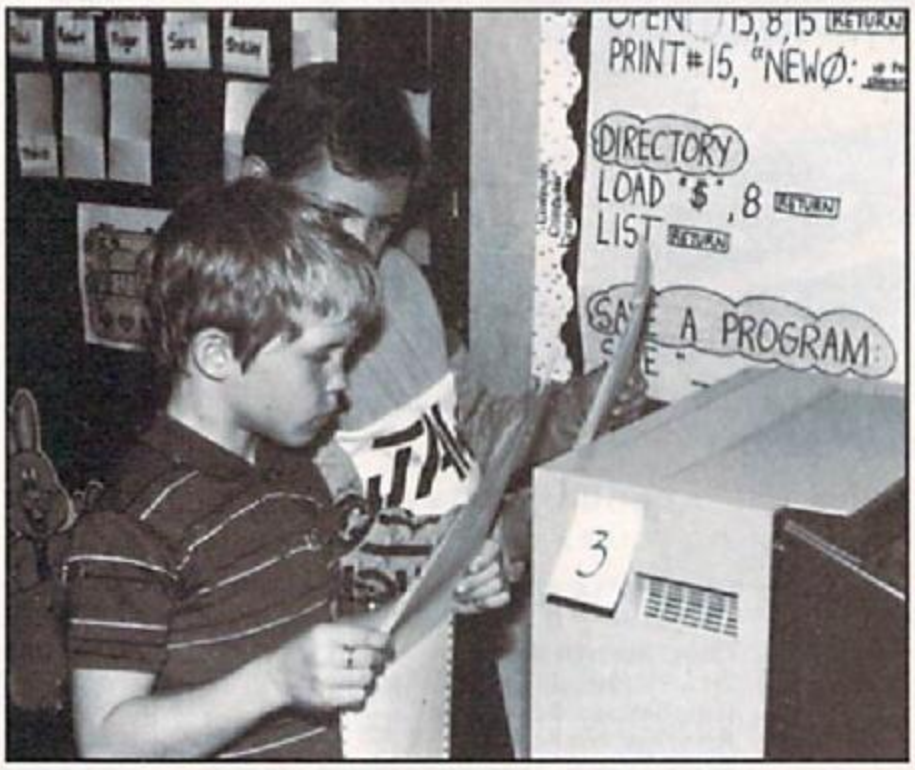
The C-64 Goes to Second Grade

Find out how one second-grade teacher is motivating her students to learn through creative uses of the computer.

By KAY GORE

When the classroom door opened after the 15-minute recess, David and Adam bolted past the teacher and headed for the Commodore 64. They pulled up chairs and sat down.

Adam twisted around in his seat and asked, "Can we work on anything we like, Ms. Hydrick?" The teacher nodded as she continued to hand out seat work to the rest of the class. David busied himself turning on the computer system and loading the word processor, Essay Writer, by Microcomputer Workshops Courseware (225 Westchester Ave., Port Chester, NY 10573).



The writing screen with the list of options appeared on the monitor. Adam carefully began to pick out the letters on the keyboard: "Once upon a time...," he paused, fingers hovered above the keys.

David, who had been sitting huddled over Adam's shoulder, brushed his friend's fingers aside and began slowly hunting for the letters on the keyboard while murmuring the words, "there was a prince...." Adam helped to direct his friend to the keys, making the typing a cooperative effort; it seemed as though a four-handed creature were composing the document rather than two seven-year-old boys.

"Hey, Corey, can we use your name?" David called across the classroom.

"Sure," answered Corey, not even looking up from his work.

"...named Corey," David mumbled as he typed.

One of the rules established early in the year was that the children had to ask permission if they used a classmate's name in their writing. The class continued this tradition when they started writing on the computer.

The boys both stopped typing, and Adam leaned back in his chair, distancing himself from the monitor. "Once a upon a time there was a prince named Corey...," he read aloud to David, who, face propped in hands, was reading the passage intently to himself.

"...and all the girls loved him," Adam finished the sentence. Both boys giggled.

"Let's say that Shannon loves Corey, 'cause she does," David suggested as a possible way to continue the story.

"If he is a prince, then he should love a princess, so we gotta say that a princess loves him," Adam argued.

"Not always," retorted David. "The girl can be a girl, but when she falls in love with the prince, she becomes a princess. A guy can't become a prince, but girls can become princesses real easy."

David started looking for the keys: "All of the princesses thought he was cute."

As David typed, Adam got up from the computer and walked over to where Shannon sat. "Hey, Shannon, is it all right if we use your name?"

"What are you going to use it for?" challenged Shannon.

"We are writing the story of a prince and a princess who are in love. Corey is the prince and we wanted you to be the princess. O.K.?"

"Yep," responded Shannon, grinning widely.

"Thanks," said Adam, and scooted back to the computer.

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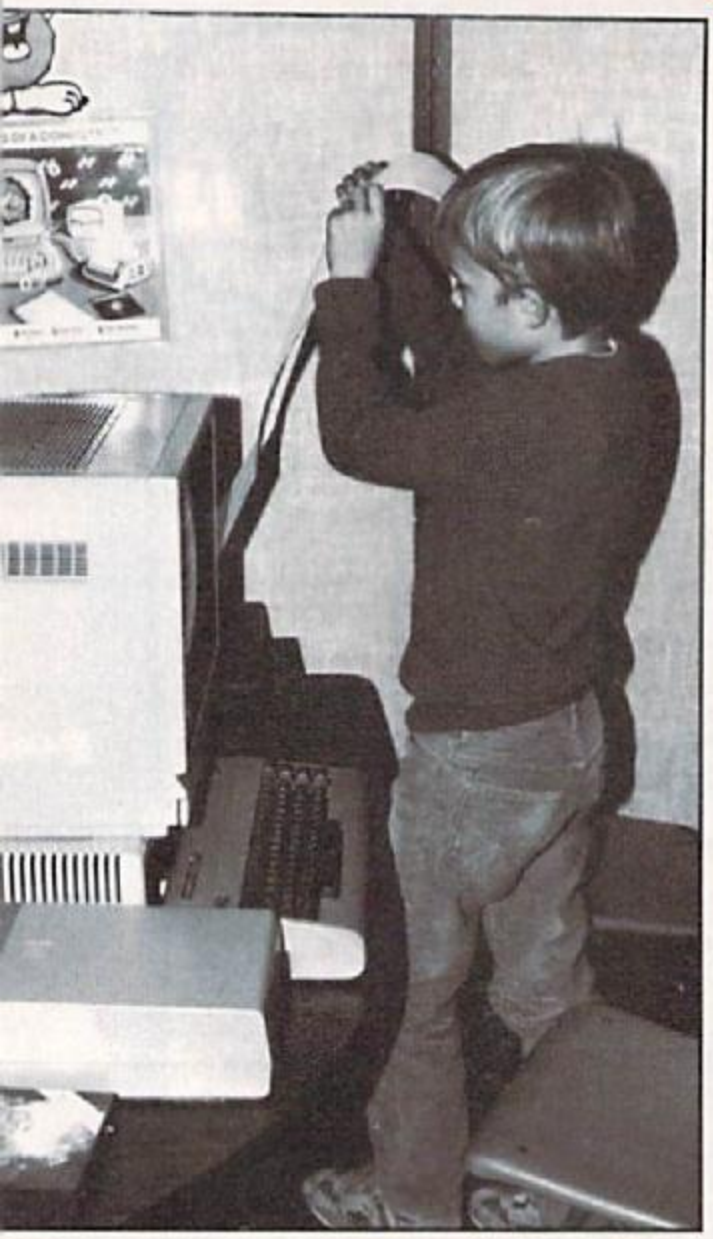

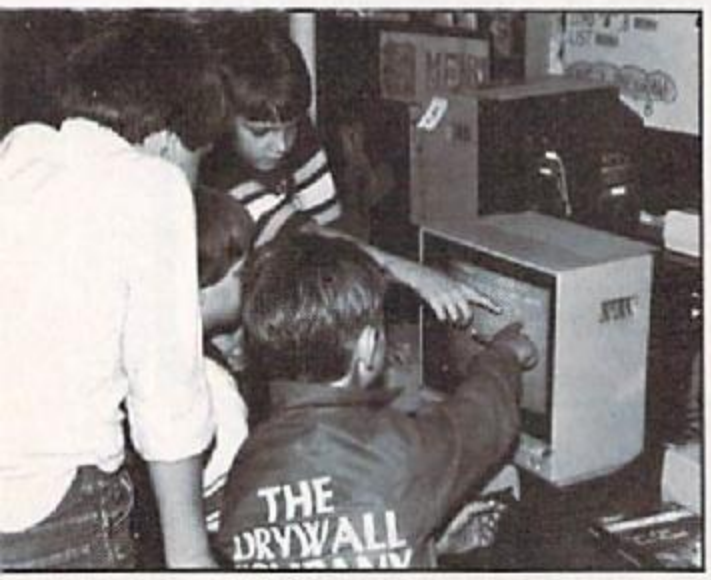

David stopped typing so Adam could read: "Once a upon a time there was a prince named Corey and all of the princesses thought he was cute." Adam said the words slowly, as if weighing them to be sure each one belonged and was the best possible choice. "It's great," he said with a nod of his blond head.

David continued typing: "One of the princesses was named Shannon."

"Now what can happen?" Adam sighed.

"They lived happily ever after," David said with finality.

"O.K." Adam seemed satisfied, so both boys started looking for the keys. Once the story was complete, Adam pressed the keys to access the print menu; David got up and turned on the printer.

For these children, the computer has added another dimension to learning.

"O.K.?" Adam asked.

"Yep," answered David, assuring Adam that the paper was correctly positioned and that the printer's on-line light was on.

Adam pressed the return key without bothering to set any parameters until the printer started printing. Then Adam jumped out of his seat and joined David to watch the final product print out.

"Make one for me, Adam, and one for Ms. Hydrick," David instructed. "Me, too," chirped Shannon, who had left her seat to join the boys. So Adam restarted the process.

David and Adam were two proud authors who had gained a sense of writing as a collaborative effort, rather than as a solitary activity in which the writer wrestles alone with words. And writing *is* a collaborative effort in that the author must consider the reader.

A Classroom Companion

Here in Ms. Janie Hydrick's second-grade class in Mesa, Arizona, three Commodore 64s have created a writing environment where children learn to respect one another and gain insight into the complex web of interactions that the writer must consider. (As a follow-up exercise, the teacher reviews the story with the student and corrects spelling, punctuation, grammar, sentence structure, and so on.) The computer is also an integral part of class instruction, used to implement and enrich the curriculum.

Hydrick chose to use C-64s mainly because of their low cost; for the price of one Apple or IBM computer, she could buy three C-64s. As she puts it, "I can have at least six of my 28 students on the computers at one time, instead of just two with a more expensive brand."

With three computers in the classroom, Hydrick doesn't have to worry about being without a computer. If one develops a mechanical problem (or if a student who took the computer home over the weekend is out sick on Monday), Hydrick still has two.

"I feel sorry for those teachers who have only one computer," she says, "and one that is all too often highly sensitive to the unwitting abuse of young users. One problem with the computer can set their curriculum back two weeks. That's something I will never have to face with my Commodores."

In fact, in the two years Hydrick has had the computers—two years of hard use and being dragged home on weekends, holidays and during summer vacation—the computers have had no mechanical problems until recently, when one disk drive had to be fixed, at a cost of only $7. Since Hydrick purchased the computers herself and must maintain them with her own money, she appreciates their durability.

But Commodore computers are not just durable, inexpensive machines to this teacher. Hydrick says that even if the cost were higher, she would still choose the C-64 because of its wealth of software, some of which, such as SkyTravel and Just Imagine, runs only on the C-64. The machine's color, graphics and sound capabilities also help make it the computer of choice in the primary classroom.

As I was leaving the room, I paused by another C-64 to watch a group of five students building a database on Native Americans with MasterType's Filer. For these children, the computer has added another dimension to learning.

As Hydrick says, "Where else but with computers does a second-grader have power and control in his or her life?" These students selected their topic, researched it and were now in the process of creating a very valuable learning tool for their peers—all

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without the teacher. For 28 second-graders at MacArthur Elementary School, the C-64 is a tool that reinforces their learning and helps them explore their world.

Classroom Lesson

If you would like to introduce your students to the power of the computer and enrich the learning environment in your classroom, here is an activity that Ms. Hydrick uses to introduce her students to major word processing concepts. This activity lets the children use all of the features of the word processor on a story written by the teacher. The students then follow up with a sequel or chapter of their own.

The teacher writes a brief, amusing story about three adventurous days in the lives of three children, but describes the days out of chronological order. She also includes a few sentences that do not belong in the story at all. She then saves the story on disk.

The students then go to work, retrieving the story from disk and editing it. When this is done, they write and edit a sequel, a fourth-day adventure, save it and print it out.

When the children edit the story, there are several editing techniques they can use, in whatever order they wish. For example, they can find and replace the names of the children in the story with any others they wish to use.

They must, of course, find and erase the sentences that do not belong in the story, and they also need to move blocks of text to rearrange the first, second and third days of the story in proper order. Finally, they must save the edited story to their own disks for future reference.

The children sometimes enjoy writing the fourth-day adventure in teams or small groups. They can then save this adventure to disk, exchange stories from disk to disk, combine stories and even print and bind volumes of fourth-day adventures.

In the process of editing, the young authors have taken great liberty with each other's texts, thus learning how to perform many editing tasks. They thus develop the knowledge and willingness to edit their own stories. R

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Easy Disk-File Conversion

By KEN STANGE

Having trouble with your file formats? These C-64 utilities make translating between sequential and program files a breeze.

The average programmer uses two kinds of disk files: program and sequential. The essential difference between them is that Basic reserved words and commands, carriage returns, etc., are tokenized (abbreviated into one-byte code) in program files, whereas sequential files read just as ordinary text.

When you type a command such as Print and press the return key, the command is tokenized. It is the carriage return that initiates the tokenization. If you write a one-line program and, instead of pressing the return key, you cursor down, type RUN and hit the return key, nothing happens. This is because the leading line number and a carriage return are needed to enter a program line and tokenize the Basic commands in that line.

Because of tokenization, program files are stored in more compact form than sequential files. You cannot directly load a program file into a word processor or terminal buffer. If you could, you'd see an almost incomprehensible mixture of text and the odd characters that are the tokens, the codes, for the Basic commands.

Need for Sequential Files

You learn about program files as soon as you start computing, in connection with loading and saving programs, and they are, superficially, the easiest to manipulate. In some senses, however, sequential files are actually easier to use. The storage format is simpler, the manipulation of the contents easier and transportability greater.

To take advantage of these characteristics, there are times when it's helpful to translate program files into sequential files and then back again. Let's say you want to send a program to a friend via modem. Unless you have a terminal program (such as XMODEM, for example) that supports a standard protocol, sending the program as a sequential file, character by character, is sometimes the only way to accomplish it.

This involves de-tokenizing your program, and, once you've sent it as a sequential file, your friend will have to re-tokenize it. In other words, you need a way to translate, or convert, a program file into a sequential file and then back again.

Another need for this conversion arises in writing programs. If your word processor can read sequential files, polishing a program on the word processor is infinitely easier than doing so in the Edit mode. (You can't, of course, actively debug it. But you can easily renumber lines and otherwise fine-tune its structure.)

Also, unless you like to test every few lines of code as you write them, creating the first version of a program is easier with a word processor.

In working out a way to set up this conversion, I first investigated different methods of storing a program as a sequential file.

The easiest way involves using the technique of listing to a device other than the screen or printer, as a listing is simply a non-tokenized printout of a program. You can list to the disk drive, and the procedure is virtually the same as listing to a printer.

It's a bit unnerving when you do this for the first time, because the disk drive doesn't stop whirring after the file is written. The only cue that the listing is complete is the return of the blinking cursor to the screen.

Program File to Sequential File

Here are the instructions on converting a program file to a sequential

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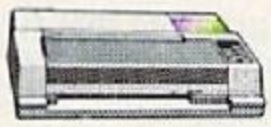

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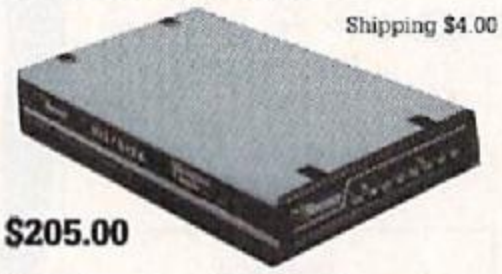

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file. Note: Don't try to compress all of these commands into one line.

1. Load and list your program; then insert the disk on which you wish to write the program as a sequential file.
2. Type: OPEN15,8,15,"I" <return>
3. Type: OPEN8,8,8,"0:<filename>,S,W" <return> (Be careful not to use the same name as *any* kind of file on that disk.)
4. Type: CMD8:LIST <return>
5. When the cursor reappears, type: PRINT#8:CLOSE8:CLOSE15 <return>

If you check your disk directory at this point, you'll see that your program is now in sequential form, capable of being manipulated inside a word processor or sent to a friend via a modem.

Sequential File to Program File

The next step is the translation of the sequential file back into a program file, and it's a bit more complicated. It isn't very difficult to get the lines of the program on the screen, but in order to tokenize them, you have to press the return key after each line; and you must do this outside of the program.

The following program was written to make this chore automatic. By utilizing a technique called dynamic keyboard action, the computer can terminate a program, perform a task in Immediate mode and then reenter the program—all automatically. It is as if you are programming the computer to program itself.

For practical purposes, the program is very tightly packed, so it's difficult to read. However, for those interested in the techniques involved, which also have many other applications, I've included a detailed explanation of the code.

When you run the Tokenizer program, it automatically reads into memory the sequential file version of your program, tokenizes each line and, finally, erases itself. You are left with only your program stored in the computer, ready for saving and running in the usual manner.

Some Cautions

Take careful note of the following warnings when you're working with the Tokenizer program:

1. After typing in Tokenizer, save it before attempting to run it, because it self-destructs.

2. Tokenizer will not work with programs that are more than 19K or 76 blocks long, because it splits Basic RAM into two parts, one-half of which stores the tokenized program, and the other half the non-tokenized version.

3. The program that you're tokenizing cannot have any of the same line numbers as the Tokenizer program. If it does, make sure you change them before creating the sequential file.

Here are instructions on converting a sequential file to a program file.

1. Type: LOAD "TOKENIZER",8 and run it.
2. You will be prompted for the filename of the sequential file you are converting to a program file.
3. After you give it a filename, Tokenizer will read the sequential file into memory. This may take some time, so be patient. Then the program lines will appear, one by one, on the screen as the tokenization is performed. When all the lines have been tokenized, your converted file will be listed. You can then save it or run it.

Explanation of Tokenizer Program

Line 63000—Initializes outside-of-program counters to zero and resets top-of-Basic RAM to leave room for Poking in the ASCII values of the sequential file (top of memory is reset to 21504). It also sets a short delay loop.

Line 63001—Sets up screen format.

Line 63002—Asks for filename from user.

Line 63003—Opens file and checks for disk errors.

Line 63004—Reports any disk errors and then resets.

Line 63005—Counts the characters coming in. It also gets a character from the sequential file and sets the status variable. This line Pokes the ASCII value of the characters into sequential memory locations above the top-of-Basic memory and checks for the end-of-file marker. If the marker is not present, the line continues to read in characters and Poke them into memory.

Line 63006—If the end-of-file marker is found, this line closes communication with the disk drive, Pokes in an equals sign and a carriage return to mark in memory the end of the file. (An equals sign would never normally occur before a carriage return in a functional program.) It also returns the cursor to the correct position for dynamic keyboard reading and starts the following loop.

Line 63007—This is the beginning of the loop that prints line numbers

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from the beginning of this program up to and including this line, so that dynamic keyboard action can delete them. It also prints a statement telling you to run the second part of the program, which will be started by dynamic keyboard action. In addition, this line sets up the keyboard buffer size and starts the loop that Pokes in carriage returns. Finally, it ends this section of the program and initiates dynamic keyboard action.

Line 63008—Positions the cursor for dynamic keyboard action.

Line 63009—Counts, using outside-of-program counters.

Line 63010—Resets the part of the counter that registers numbers 1–100.

Line 63011—Checks value of character stored in a specific memory location. If that character is not a carriage return, printing continues.

Line 63012—If that character *is* a carriage return, this line checks to see if it is the end-of-program marker (equals sign). If so, the cursor is positioned for dynamic keyboard action. This line also begins the loop that prints line numbers for the remainder of the program. Finally, execution goes to line 63014.

Line 63013—If the character is *not* an equals sign, this line prints a statement telling you to run the program again and resets the keyboard buffer range. This line also begins the loop that Pokes in carriage returns. After the loop is executed, dynamic keyboard action is initiated, tokenizing the line from the sequential file and restarting.

Line 63014—Returns the computer to normal configuration.

Line 63015—Prints LIST, positions the cursor for dynamic keyboard action and sets the buffer range. It also begins the loop that Pokes in carriage returns. After the loop is executed, the program ends with dynamic keyboard action erasing the remainder of the Tokenizer program and listing the tokenized program to the screen. R

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Listing 1. *The Tokenizer program.*

```
63000 POKE826,0:POKE827,0:POKE52,84:POKE56,
      84:CLR:FORI=1TO5000:NEXT:CLR :REM*120
63001 PRINT"{SHFT CLR}{CTRL 2}{CRSR DN}SEQ
      TO PRG FILE CONVERTER - K. STANGE":PO
      KE5328Ø,2:POKE53281,2          :REM*29
63002 INPUT"{4 CRSR DNs}{CTRL 8}FILE TO BE
      CONVERTED";NA$:PRINT"{3 CRSR DNs}NOW
      READING THE FILE... "          :REM*170
63003 OPEN15,8,15,"I":OPEN8,8,8,"0:"+NA$+",
      S,R":INPUT#15,EN,ER$,ET,ES     :REM*155
63004 IFEN<>0THENPRINT"DISK ERROR: ";ER$:CL
      OSE8:PRINT#15,"I":CLOSE15:RUN:REM*108
63005 C=C+1:GET#8,A$:RS=ST:POKE2151Ø+C,ASC(
      A$):IFRS<>64THEN63005          :REM*183
63006 CLOSE8:POKE2151Ø+C+1,61:POKE2151Ø+C+2
      ,13:PRINT"{SHFT CLR}{2 CRSR DNs}":FOR
      I=63000TO63007                 :REM*52
63007 PRINTI:NEXT:PRINT"RUN63008{HOME}";:PO
      KE198,1Ø:FORI=631TO64Ø:POKEI,13:NEXT:
      END                            :REM*219
63008 PRINT"{SHFT CLR}{2 CRSR DNs}":CLR
                                     :REM*180
63009 C=(PEEK(826)*1ØØ)+PEEK(827)+2151Ø
                                     :REM*79
63010 IFPEEK(827)=1ØØTHENPOKE826,(PEEK(826)
      +1):POKE827,Ø                  :REM*50
63011 POKE827,(PEEK(827)+1):PRINTCHR$(PEEK(
      C));:IFPEEK(C)<>13THEN6300Ø    :REM*39
63012 IFPEEK(C-1)=61THENPRINT"{SHFT CLR}{2
      CRSR DNs}":FORI=1TO8:PRINT63007+I:NEX
      T:GOTO63014                    :REM*244
63013 PRINT"{3 CRSR DNs}GOTO63008{HOME}";:P
      OKE198,1Ø:FORI=631TO64Ø:POKEI,13:NEXT
      :END                           :REM*131
63014 POKE826,Ø:POKE827,Ø:POKE52,16Ø:POKE56
      ,16Ø:CLR                       :REM*86
63015 PRINT"LIST{HOME}";:POKE198,1Ø:FORI=63
      1TO64Ø:POKEI,13:NEXT:END       :REM*11
```

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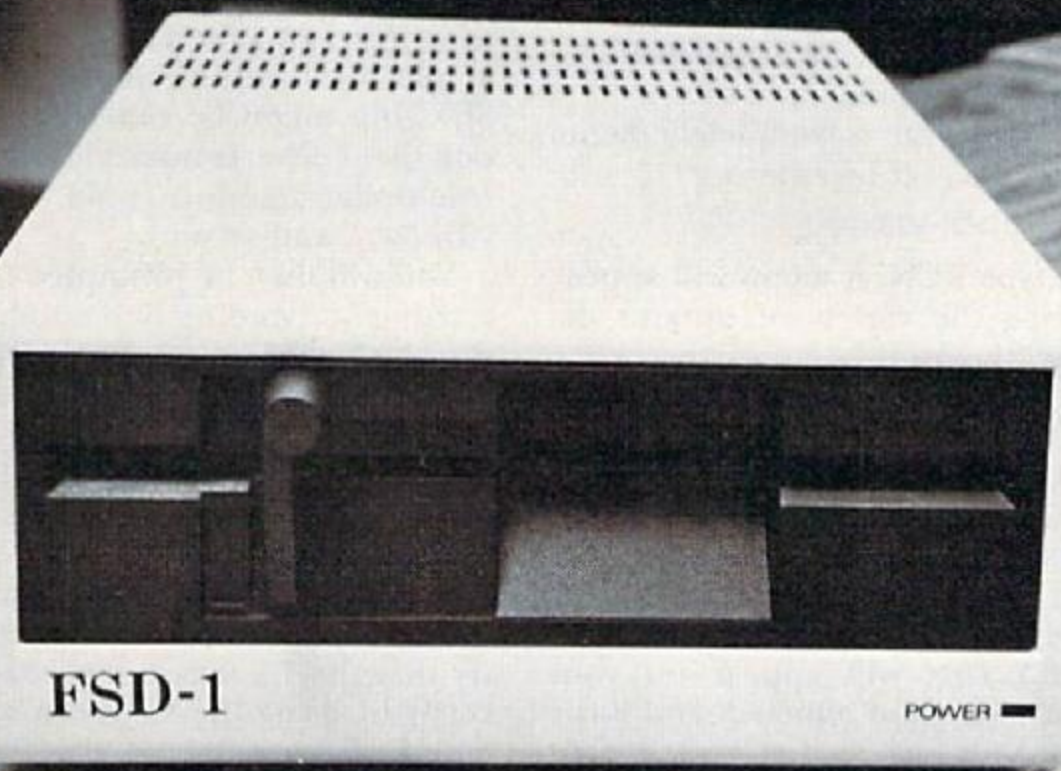

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Quick Merge!

By RICHARD De A'MORELLI

If you write your own Basic programs or utilities, you've probably developed several useful subroutines that you frequently want to include in new programs.

For instance, you may have a subroutine that checks the current cursor position to prevent scrolling; another that produces a beep and requests user input; and perhaps another that sets up and Pokes values to your computer's sound chip. The possibilities are endless.

If you write your own programs, you know that the process of typing in Basic lines, checking for typos and debugging is time-consuming and tedious. And having to retype those same lines, again and again, whenever you want to include them in a new program, is even more tiresome.

Wouldn't it be nice if you never had to type, proofread and debug your favorite subroutines more than once; if you had a master program containing dozens of program modules that you could access in a few seconds with just a few keystrokes?

Well, Quick Merge will give it to you!

With this easy-to-use utility, you type in your favorite subroutines only once and save them to disk. You can then, within seconds, retrieve or merge them into any program you're writing.

Save yourself the trouble of retyping your handy subroutines by letting your computer and disk drive do all the work.

How to Use Quick Merge

Quick Merge works by saving blocks of Basic program lines in the form of sequential files. Through a process that utilizes the C-64's dynamic keyboard feature, you can then easily recall those files and merge them into whatever program you're writing. You don't have to contend with any Peeks and Pokes or remember any memory locations.

Quick Merge is completely menu-driven. Load it by entering

```
LOAD"QUICK MERGE",8
```

then type RUN. A menu will appear offering the variety of options described below.

Program Options

The first option, View File, lets you examine any existing Quick Merge file. (Of course, the file you select must be on the disk currently in the drive, or a File Not Found error will result.) Text will appear on your screen with line numbers and Basic commands, just as if you were viewing an actual program listing. When the end-of-file marker is reached, you'll be returned to the main menu.

Please note that Quick Merge filenames are always preceded by a slash (/). For instance, a subroutine named "Tones" would actually be saved as "/Tones". (You needn't enter the slash; the computer adds it automatically.) This makes it easy to distinguish these files from others on a disk.

The second option, Save File, lets you save any selected block of program lines currently in memory. Before using this option, you must type in some of your own program lines using option #10 (Write New Program).

You'll then be prompted for a unique filename (up to 15 letters). Always try to assign names that are descriptive of a file's content. For example, a subroutine that sets up the SID chip might be called "/Sound"; one that converts numeric strings to true dollar amounts could be called "/Dollar", and so on.

You will then be prompted for the starting and ending line numbers of the block to be saved. The computer checks to ensure that the filename you've chosen does not already exist on your disk. If everything is all right, the program will save, in a sequential file, the program lines you've indicated. When the process is finished, the menu will reappear. You can verify that the file has transferred correctly by using the View option and entering the name of the file just created.

When using Save, you are limited

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First, load and run Quick Merge. Next, select menu option 10 (Write New Program). Quick Merge will terminate, and brief instructions will appear on the screen.

In Direct mode, type whatever program lines you wish to enter, making sure your line numbers remain below 63900.

For example:

```
10 "{SHFT CLR}HELLO!"
20 PRINT"THIS CREATES A DEMO FILE"
30 PRINT"WHAT IS YOUR NAME?":INPUT N$
40 PRINT"THANK YOU,";N$
50 END
```

Still in Direct mode, type RUN 63900 to reactivate Quick Merge. Choose menu option 2 (Save File), and you'll be prompted to enter a filename. Type "DEMOFILE" as the filename.

In this example, when prompted, type 10 as the starting line number and 50 as the ending line number.

A Quick Merge program file will now be created and stored on disk. After a few moments, the menu will reappear. Select menu option 7 (Directory), and you'll see that a new file called "/DEMOFILE" has been created.

Once a Quick Merge file has been created, you may use any of the other menu commands to view, edit, merge, copy to another disk, print, etc.

Next, select menu option 11 (Exit to Basic) and delete lines 10–50. Type RUN 63900 to restart Quick Merge.

Select menu option 3 (Merge).

Type "DEMOFILE" as the file to be merged.

The file will be displayed on the screen as it is read into memory. When the last character has been read, the number of bytes in the file will be displayed.

Each program line in the file will now flash rapidly on the screen as it is merged into the Quick Merge program. When the final line has been merged, the menu will reappear.

Finally, select menu option 11 again and list lines 10–50. You'll see that they are merged into Quick Merge. You could just as easily have merged a hundred lines or a dozen different program modules!

Table 1. *Example of how to use Quick Merge.*

to a maximum file length of 4096 characters. There is no limit to the number of actual program lines that can be saved.

The third option, Merge, is not merely an Append utility; rather, it achieves true merging of program modules into whatever master program is currently in memory. You'll be asked to enter the name of the file to be merged, and the rest is automatic.

The computer ensures that the specified file exists. If it does, it is displayed on the screen while being read into memory. Actually, the file does not consume any Basic memory: It is Poked as ASCII characters into the 4K bank of free RAM at address range 49152–53247. As each program line appears on the screen, it is automatically merged into your existing program.

This Merge feature is a wonderful, time-saving convenience; but bear in mind that program lines loaded from the new file will overwrite any existing lines having the same number in the current program. Therefore, I suggest that you first view the file to make sure line numbers in that block do not duplicate existing lines. If necessary, change line numbers in your main program so they won't be overwritten.

When the merge is complete, you can exit to Basic and list your program; you will see that the new lines have actually been mixed into the original program! In this manner, you can merge as many of your favorite subroutines as you wish and, within minutes, build an elaborate program containing hundreds or even thousands of bytes, without ever typing a single Basic line or having to proofread or debug a single command!

Once you've begun assembling a library of program files, the Rename menu option permits you to update filenames. You'll be prompted for the old and new filenames, and the file will be renamed accordingly.

When you no longer want a program file, use the Erase option and type the name of the program to be erased. It will be permanently deleted from disk.

If you rewrite an existing file and want to save it in place of the old version, the Rewrite option will do it automatically.

The Directory option will display any disk directory without disturbing the current program in memory. This is helpful when you are searching for a file or when you can't remember the filename you assigned to a program module.

The Duplicate option is a handy feature that lets you copy any Quick Merge sequential file from one disk to another. You'll be prompted for the filename to be copied, and it will be read into memory. You will then be told to insert the destination disk. An exact copy of the original file will be duplicated on the second disk.

The Print option is a convenient feature that sends to your printer the contents of any Quick Merge file. The file is also displayed on the screen as it is printed. When the end-of-file marker is reached, the main menu will reappear.

The Write New Program is the option you must use before actually saving a Quick Merge file. It temporarily halts Quick Merge, and you will be instructed to type in your program lines. When finished, check your typing accuracy and then reactivate Quick Merge with RUN 63900. You can now use the Save option to create a permanent Quick Merge file of the program lines you just entered, and you'll never have to type those lines again!

Quick Merge has high line numbers, (63900–63999), so as not to interfere with the assembly of your main program. When writing or merging program modules, just be sure to keep your Basic line numbers below 63900. R

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Listing 1. *Quick Merge program.*

```
639ØØ REM *** QUICK MERGE ***          :REM*171
639Ø1 OPEN15,8,15:POKE53281,1:POKE5328Ø,Ø:I
      FM$(Ø)<>""THEN639Ø7              :REM*166
639Ø2 RESTORE:FORX=ØTO1Ø:READM$(X):NEXT
                                       :REM*1
639Ø3 DATA"1> VIEW FILE","2> SAVE FILE","3>
       MERGE FROM DISK","4> RENAME     :REM*78
639Ø4 DATA"5> ERASE","6> REWRITE FILE","7>
      DIRECTORY","8> DUPLICATE"        :REM*237
639Ø5 DATA"9> PRINT","{CRSR LF}1Ø> WRITE NE
      W PROGRAM","{CRSR LF}11> EXIT TO BASI
      C"                               :REM*236
639Ø7 PRINTCHR$(142)"{CTRL 7}{SHFT CLR}{CRS
      R DN}{2 SPACEs}{CTRL 9}QUICK MERGE ME
      NU {CTRL Ø}{CRSR DN}":FORX=ØTO1Ø:PRIN
      T"{2 SPACEs}"M$(X):NEXT          :REM*158
639Ø8 PRINT:INPUT"{2 SPACEs}SELECT";K$:K=VA
      L(K$):F$="{CTRL 9}NONE":IFK<1ORK>11TH
      EN639Ø7                          :REM*23
639Ø9 IFPEEK(679)THENF$="":FORX=68ØTO68Ø+PE
      EK(679)-1:F$=F$+CHR$(PEEK(X)):NEXT
                                       :REM*24
6391Ø IFK=4ORK=7ORK>9THEN63912         :REM*45
63911 PRINT"{CRSR UP} FILE{SHFT SPACE}IN{SH
      FT SPACE}RAM: "F$"{2 CRSR DNs}":INPUT
      " FILE NAME: ";F$:GOSUB63917 :REM*242
63912 ONKGOTO6392Ø,6393Ø,6394Ø,63913,63915,
      63915,6397Ø,6392Ø,6392Ø,63998,63999
                                       :REM*99
63913 INPUT"OLD NAME ";F$:INPUT"CHANGE TO";
      FX$:GOSUB63917                   :REM*66
63914 F$="RØ:"+FX$+"="+F$:PRINT#15,F$:GOSUB
      63996:GOTO639Ø7                  :REM*195
63915 PRINT:GOSUB63917:PRINT#15,"SØ:"+F$:IF
      K=5THEN639Ø7                     :REM*42
63916 GOTO6393Ø                        :REM*189
63917 IFLEFT$(F$,1)<>"/"THENF$="/"+F$:POKE6
      79,LEN(F$)                       :REM*246
63918 IFK=4THENIFLEFT$(FX$,1)<>"/"THENFX$="
      /"+FX$                           :REM*1
63919 FORX=68ØTO68Ø+PEEK(679):POKEX,ASC(MID
      $(F$,X-679,1)+CHR$(Ø)):NEXT:RETURN
                                       :REM*11Ø
6392Ø PRINT"{SHFT CLR}FILE: "F$:GOSUB63995:
      IFK=8THENCH=Ø:PRINT"TRANSFERRING FILE
      ..."                             :REM*23
63921 IFK=9THENCLOSE4:OPEN4,4,7        :REM*12Ø
63922 GET#2,K$:IFK=9THENL$=L$+K$:IFK$=CHR$(
      13)THENPRINT#4,L$;:L$=""         :REM*2Ø7
63923 IFK=8THENCH=CH+1:POKE49151+CH,ASC(K$+
      CHR$(Ø)):GOTO63925               :REM*58
63924 PRINTK$;:IFPEEK(214)>22ANDK$=CHR$(13)
      THENGOSUB6399Ø:PRINT"{SHFT CLR}"
                                       :REM*69
63925 IFST=.THEN63922                  :REM*168
63926 IFK=9THENPRINT#4,L$:PRINT#4:CLOSE4:GO
      TO63929                          :REM*45
63927 IFK=8THENPRINT"INSERT TARGET DISK":CL
      OSE2:GOSUB63991:OPEN3,8,3,F$+",S,W"
                                       :REM*162
63928 IFK=8THENGOSUB63996:FORX=1TOCH:PRINT#
      3,CHR$(PEEK(49151+X));:NEXT:CLOSE3
                                       :REM*5
63929 PRINT"-END-":Q=-1:GOTO6399Ø      :REM*112
6393Ø INPUT" SAVE FROM LINE#";LS:INPUT" TO
      LINE#{7 SPACEs}";LF:IFLF=<LSTHEN639Ø7
                                       :REM*25
63932 F$=F$+",S,W":GOSUB63995:PRINT"{CTRL 2
      }{SHFT CLR}CMD2:LIST"LS"-"LF     :REM*51
63933 PRINT"{2 CRSR DNs}PRINT#2:CLOSE2:RUN6
      39ØØ":PRINT"{3 CRSR DNs}{CTRL 7}SAVIN
      G...{CTRL 2}"                    :REM*92
63934 POKE631,19:FORZ=632TO635:POKEZ,13:NEX
      T:POKE636,8:POKE198,6:END        :REM*11
6394Ø GOSUB63995:PRINT"{SHFT CLR}READING: "
      F$:BANK=49152                    :REM*2Ø1
63946 GET#2,K$:IFSTTHEN63954           :REM*121
63947 PRINTK$;:POKEBANK+LOC,ASC(K$):LOC=LOC
      +1:IFLOC<4Ø96THEN63946           :REM*68
63948 PRINT:PRINT"{CTRL 9}FILE OVERFLOW":Q=
      -1:GOTO6399Ø                     :REM*2Ø3
63954 CLOSE2:PRINT"-END-":PRINT"{CRSR DN}ME
      RGING "LOC-2"BYTES -- WAIT!"     :REM*51
63956 POKE1Ø2Ø,INT(BANK/256):POKE1Ø21,BANK-
      (PEEK(1Ø2Ø)*256)                 :REM*183
63957 LOC=LOC+BANK:POKE1Ø22,INT(LOC/256):PO
      KE1Ø23,LOC-(PEEK(1Ø22)*256)      :REM*88
63958 FORT=1TO1ØØØ:NEXT:PRINT"{SHFT CLR}";
                                       :REM*89
6396Ø BANK=(PEEK(1Ø2Ø)*256)+PEEK(1Ø21):LOC=
      (PEEK(1Ø22)*256)+PEEK(1Ø23)      :REM*143
63961 FORX=BANK TO LOC:PRINTCHR$(PEEK(X));:
      IFPEEK(X)<>13THENNEXT:RUN639ØØ
                                       :REM*136
63963 X=X+1:POKE1Ø2Ø,INT(X/256):POKE1Ø21,X-
      (PEEK(1Ø2Ø)*256)                 :REM*4
63964 IFPEEK(1Ø24)<48ORPEEK(1Ø24)>57THEN639
      6Ø                               :REM*253
63965 PRINT"{HOME}{5 CRSR DNs}{CTRL 2}G{SHF
      T O}6396Ø{CTRL 7}{HOME}";:POKE631,19:
      POKE632,13:POKE633,19            :REM*16Ø
63966 FORY=634TO638:POKEY,17:NEXT:POKE639,1
      3:POKE198,9:END                  :REM*53
6397Ø REM---DIRECTORY                  :REM*2Ø9
63971 CLOSE2:OPEN2,8,Ø,"$Ø":PRINT"{SHFT CLR
      }":GET#2,X$,X$                   :REM*124
63972 GET#2,X$,X$,X$,Y$:C=ASC(X$+CHR$(Ø))+A
      SC(Y$+CHR$(Ø))*256               :REM*19
63974 GET#2,Y$:IFSTTHENPRINT:PRINT"{2 CRSR
      UPs}{7 CRSR RTs}BLOCKS FREE":Q=-1:GOT
      O6399Ø                           :REM*37
63975 GET#2,Y$:IFY$=CHR$(32)ORY$=CHR$(34)TH
      EN63975                          :REM*74
63979 Z$=Z$+Y$                         :REM*234
6398Ø GET#2,Y$:IFY$=CHR$(34)THEN6398Ø
                                       :REM*145
63981 IFY$<>""THEN63979                :REM*192
63983 PRINTC;:IFC=ØTHENPRINT"{3 CRSR LFs} D
      IR:{CTRL 9}";                    :REM*22Ø
63984 POKE211,7:PRINTZ$:Z$="":IFPEEK(214)>2
      1THENPRINT:GOSUB6399Ø:PRINT"{SHFT CLR
      }";                              :REM*163
63986 GOTO63972                        :REM*7
6399Ø PRINT"{CRSR DN}";:IFQ<>-1THENPRINT"{L
      EFT ARROW} FOR MENU{2 SPACEs}OR ";
                                       :REM*169
63991 PRINT"-PRESS ANY KEY-";:POKE198,Ø:WAI
      T198,1:Y=PEEK(631):K$=CHR$(Y):REM*1Ø4
63992 POKE198,Ø:IFK$="{LEFT ARROW}"ORQ=-1TH
      ENCLOSE2:RUN639ØØ                :REM*193
63993 PRINT:RETURN                     :REM*18
63995 CLOSE2:OPEN2,8,2,F$              :REM*228
63996 INPUT#15,E,E$:IFE<2ØTHENRETURN
                                       :REM*217
63997 PRINT"{CRSR DN}DISK ERROR#"E;E$:PRINT
      #15,"I":Q=-1:GOTO6399Ø           :REM*22
63998 PRINT"{SHFT CLR}{2 CRSR DNs}TYPE PROG
      RAM LINES. TO RESTART QUICK MERGE, TY
      PE 'RUN 639ØØ'"                  :REM*151
63999 PRINT"{SHFT CLR}{CRSR DN}PROGRAM TERM
      INATED":END                      :REM*25Ø
```


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The Dynamic Keyboard

By WILLIAM W. BRAUN and JIM BORDEN

Here's your chance to explore the dynamic keyboard and to learn how to save memory by adding and deleting lines while your programs run.

The dynamic keyboard technique adds power and flexibility to your programming projects. With it, you'll learn how to do things that normally are only done, in the Direct mode, from the keyboard. You'll be able to delete and add lines to your programs while the program is running. You'll also learn how to make your program automatically load and run another program.

Before you start, you need to know what is meant by "dynamic keyboard technique." When you press a key, a code for that key is sent to the keyboard buffer. This buffer is a ten-byte area of RAM, located at 631–640 on both the VIC-20 and the C-64. (For the C-128, see the last part of this article.) The computer's operating system is programmed to check for characters in this buffer after the Ready message is displayed on the screen, or at an Input or Get statement.

The operating system knows how many characters are in the buffer by checking the contents of another location in RAM—198. This location holds a number from 0 through 10 that indicates the number of characters in the keyboard buffer.

If there is a 0 in 198, the computer knows it does not have any characters to retrieve from the buffer; if it finds a 5, it understands that it should pull five characters out of the buffer. It works on the FIFO principle—first in, first out—meaning the first character put into the buffer is the first one that will be retrieved from it.

Try this quick experiment. Type:

```
FOR T=0 TO 6000 : NEXT
```

After you press the return key, type in your name. The computer is tied up executing this loop, but your keystrokes are placed in the keyboard buffer, and, after loop execution is completed, your name (up to ten characters) appears on the screen.

Since the keyboard buffer and the pointer at 198 are in RAM, you can Poke numbers into them as you wish. This allows you to put information into the keyboard buffer without using the keyboard.

Suppose you want your program to execute once and then erase itself from memory so it cannot be listed or run again. Using the dynamic keyboard, you can place the needed information into the keyboard buffer just before the program ends. When the program ends, it checks the buffer and acts upon that information.

Below is a short routine that accomplishes this by making the computer execute a New command.

```
900 REM END OF PROGRAM ROUTINE
910 POKE 631,78 : POKE 632,69 : POKE
    633,87 : POKE 634,13 : POKE 198,4 : END
```

The numbers Poked into the buffer are CHR$ codes, as follows:

```
78  N
69  E
87  W
13  return key
```

You Poked a 4 into location 198 to let the computer know that there were four characters to retrieve from the keyboard buffer. When the program ends, the computer pulls the New and Return commands from the buffer and executes them just as if you had typed in NEW and pressed the return key yourself.

Note that you had to type out the Basic keyword NEW, but only had to use one CHR$ code for return. This is because code 13 is sent to the keyboard buffer whenever you press the return key. There is no single number CHR$ code for the New command. You can place any of the Basic commands into the keyboard buffer in the same way. Keyword abbreviations can also be used.

RUN It Right

C-64; C-128; VIC-20

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To convince yourself that this works, enter line 910 into your computer and run it. Now see if you can list it. Presto! The program's been deleted.

Deleting Lines and Saving Memory

You can expand this routine so that it will not only execute a New command, but will also perform Load and Run commands of another program on tape. This technique is especially useful when you don't have enough memory to run a program on the unexpanded VIC-20. You can break it up into two or more parts and have each part automatically load and run the next part. Just change line 910 of the previous routine:

```
910 POKE631,78:POKE632,69:POKE633,87:
    POKE634,13:POKE635,131:
    POKE198,5:END
```

NEW is not required, since a Direct mode load will do a NEW in any case.

With this line, you added POKE 635,131, which is a code for the Load and Run commands, and you increased the number Poked to 198 to 5. Now, when the program ends, it executes the New command and the screen displays the usual messages for loading a program. If you left the tape player in the play position, it does everything without any further action on your part.

Another way to run very long programs is to delete lines that are needed only once at the beginning of the program, before you define variables or set up arrays. Variables and arrays don't eat up memory until you actually reach the statement in the program that defines them. Often, you can list a program without exceeding your memory, but when it starts to define variables or dimension arrays, you get that dreaded Out of Memory error message. This trick allows you to free some of the memory before you define the variables.

To illustrate how this is done, assume you have written a program in which the instructions are found in lines 40, 50 and 60. You're going to delete those lines and also the deletion routine, as you won't need it again. You can do it this way:

```
100 PRINT "{SHFT CLR}{4 CRSR DNs}
    40"SPC(20)"50"SPC(20)"60"SPC(20)
    "100"SPC(20)"105"SPC(19)"GOTO110":
    PRINT"{HOME}"
105 FOR T=0 TO 5:POKE631+T,13:NEXT:
    POKE198,7 :END
110 .....
```

Note that if you're using the C-64, you must change the SPC commands to compensate for the difference in screen line lengths. (Add 18 for the C-64.)

When the routine is executed, the screen briefly displays all Print messages. On the screen you'll see

```
40
50
60
100
105
GOTO110
```

beginning at the fourth line from the top of the screen. The cursor then returns to the home position, so that when the computer reaches the End statement in line 105, the cursor ends up on the screen line with the 40, after the Ready message is displayed.

At this point, due to the Return commands you placed in the keyboard buffer, the six lines you've printed on the screen are executed in the Direct mode. The last command, GOTO110, restarts the program at line 110, as it had temporarily ended at line 105. (At this point, all variables are cleared.)

This routine is different from those previously discussed, adding a new twist. You only put Return commands in the keyboard buffer. You then put any message on the screen, set up the cursor so that it lands on the first message after READY is displayed and then go to the keyboard buffer to get those returns. As each return is executed, it's just as if you had typed in the number of the line you wanted to delete and had pressed the return key.

The End statement in line 105 is essential. The program has to end for a moment, in order to force it to get those returns from the keyboard buffer. The last return executes the GOTO110 command, which restarts the program at line 110. Any time you use this technique to delete lines or even to add lines (as you'll soon see), you need the End statement after the code that puts the returns into the keyboard buffer. You also need the last command to tell the computer where to restart the program.

Cursor Position

Note that you also need to set things up properly on the screen so that the cursor is on the right screen line when those returns are executed. You enter a SHFT CLR command and then go down four lines to start printing the line numbers and your one message. Then, before you allow the computer to perform the End statement, you place the cursor back in the home position. This ensures that when the computer reaches the End statement, it puts the ready message at the top-left corner of the screen and the cursor on the first screen line with your line numbers.

To make the screen display seem less confusing, put a Print Color command in the routine in line 100, so that the messages printed are in the same color as the screen, thus making them invisible. Then put another Print Color command in line 110 so that when the program starts up again, it will have a normal print color. This eliminates the quick flash of messages on the screen.

Since the keyboard buffer is only ten bytes long, you can only enter ten returns at a time, thus limiting the number of lines you may delete.

Adding Lines

To add lines to a program, you put the line number on the screen, along with all of the code for the new line, and then execute a Return command over it.

In the following example, you want to be able to enter data and then put that data into a new Data statement within the program. The routine for entering the data should precede the routine to put in the new line number. If you are doing a lot of these, use a variable (which must be Poked, not printed) to hold the value of successive line numbers. This routine creates a new line 900 with one piece of data, being the variable X, that is entered before the routine.

```
100 PRINT"{SHFT CLR}{4 CRSR DNs}
105 PRINT"900DATA"X:PRINT
    "GOTO115{HOME}"
110 POKE 631,13:POKE632,13:
    POKE198,2:END
115 .....
```

This routine prints the new line 900 on the screen with the Data statement and the value of the variable X. It then prints the GOTO115 command and returns the cursor to the home position.

Now, just as in the last example, the program executes the End statement, prints the Ready message and performs the two Return commands you put in the keyboard buffer. This causes the new line 900 to be added to the program. You can enter this routine into your computer and run it, after which you will see that the program now has a new line 900 with one piece of data (a zero, since you didn't define X previously).

Now that you understand the basics

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of the dynamic keyboard, keep the technique in mind when looking for solutions to your programming problems. You'll soon find uses for it that will contribute greatly to extending the power and flexibility of your computer.

The C-128's Dynamic Keyboard

The C-128 has a dynamic keyboard just like all Commodore computers, but it differs from that of the C-64 in several ways. First, the locations have been changed: the buffer to 842–851 ($034A–$0353) and the keystroke counter to 208 ($D0). As an added twist, the C-128 uses a different pair of locations to handle function keys. More on these locations later.

Except for the function keys, the C-128 dynamic keyboard works just like the C-64 or VIC. You can enter your name during a delay loop, just as described above. You can also Poke characters into the buffer and the number of those characters into the keystroke counter. Here is a program to print C-128 on the screen:

```
100 A$="C-128"+CHR$(141):
    IFLEN(A$)<11THENFORX=
    1TOLEN(A$):POKE841+X,ASC(MID$
    (A$,X,1)):NEXT:POKE208,LEN(A$)
```

The last character (141) is a shifted return—a normal return would cause a syntax error. The only difference from the C-64 is the location. Now let's look at the way the function keys are handled on the C-128.

The 128 actually has 10 programmable function keys. In addition to the 8 regular "f#" keys, you can also program the help and run/stop keys (but not from Basic). When you want a delay loop on the C-128, simply type SLEEP #, where # is the number of seconds you want the C-128 to wait. Try SLEEP 3 now, and while the computer is "sleeping," press the help key. After the delay, the screen displays READY, and then HELP. Now type:

```
SLEEP3:POKE209,0<return>
```

and again press the help key. Nothing but the regular READY prompt. So, what happened to HELP?

Location 209 ($D1) holds the number of characters in the function-key string. By Poking a zero into location 209, you actually clear the function-key indicator. This means that to ensure that *no* key is waiting in the C-128's dynamic keyboard, you have to use two Pokes. The first (POKE 208,0) clears all but the function keys, while the second (POKE 209,0) clears any function keys that may be waiting.

To put a function key into the buffer, you have one more location to Poke. This is location 210, which is an index as to where the function-key string starts. You can see all the function-key data (including the string lengths and their definitions) by using the ML monitor. First press the f8 key or type MONITOR <return>. Then type the following:

```
M 1000,105F <return>
```

To return to Basic, type:

```
X <return>
```

The first 10 bytes ($1000 to $1009, or 4096 to 4105 in decimal) are the lengths (in hexadecimal) of the function-key strings. Assuming you have not changed the function keys, they should now all be displayed on the screen. (You can read their definitions on the right side.)

We'll only work with the f1 key here. As you can see on the screen, the length of f1 is 7 (at $1000) and the text is GRAPHIC (starting at $100A). The index for the f1 key is always 0. Keep in mind, however, that if you change the lengths of any key strings, the index for subsequent keys will change.

You can redefine any of the regular (f1-f8) function keys from Basic using:

```
KEY #,"TEXT" <return>
```

where # is the number of the key you want to define and TEXT is the string you want to assign to it. Try this (having been sure to type X to exit the ML monitor):

```
KEY 1,"THE C-128 IS GREAT"+CHR$(141)
<return>
```

If you'd like, enter the monitor again to verify that f1 was actually changed. Now, from Immediate mode, type in:

```
POKE 208,0:POKE209,19:POKE210,0
<return>
```

You should see THE C-128 IS GREAT printed a few lines down.

You can see all the function keys in Basic by typing KEY (without a number) and hitting the return key. If you want to print a different string on the screen, just redefine Key 1 and use the Pokes to 208, 209 and 210. Be sure to POKE 209 with the length and 210 with the starting index. Keeping Key 1 as it is now defined (THE C-128 IS GREAT), you could redefine Key 2 to hold the string "HI, THERE". To print this string, you would enter POKE 208,0 : POKE 209,9 : POKE 210,19.

To take this one step further, you can control cursor activity on the screen. By defining Key 1 to 15 returns, you can print 15 or fewer of them by changing the number you Poke into 209. Poke it with 5, and you'll get 5 returns. You'll need a "HOME" as the first character, so type this:

```
A$=CHR$(19):FORX=1TO15:A$=A$+
CHR$(13):NEXT: KEY1,A$ <return>
```

Then type the following line:

```
PRINT"{SHFT CLR}";:FORX=1TO5:PRINT
X"REM":NEXT:POKE209,6:POKE210,0
<return>
```

and type LIST after the cursor appears. You should have a five-line program, with REM on each line. Notice that 6 was used as the length for HOME + 5 returns.

This should open up all sorts of possibilities for printing commands on the screen and using the correct number of returns to execute them. You can define one function-key string up to a maximum of about 240 characters. If you exceed the total length for all keys, an Out of Memory error will result.

There are two more twists regarding the function keys and the dynamic keyboard. Only *one* function key—the *last* one pressed—will be accepted. Type SLEEP 5 and hit the return key. Press several function keys, but be sure you press the help key last. You should see HELP printed on the screen. So the last function key pressed is the only one that counts! Moreover, even if you press a function key *within* a group of other keys, that function key will always be printed first! Try typing SLEEP 5 again, but then type 123<HELP>456 during the pause. The following should be printed:

```
HELP
123456
```

That covers the basics of the C-128 dynamic keyboard. One other interesting point is that entering or editing a line on the C-128 does *not* clear variables. This makes it quite simple to add data statements to the end of a program. You must use a GOTO to get back into the program, however, since RUN (or NEW or CLR) *will* clear all variables. R

Address C-64 questions to William W. Braun, 3164 Wellington Way, Arnold, MO 63010; address C-128 questions to Jim Borden, Borden Software, 641 Adams Road, Carlisle, PA 17013.

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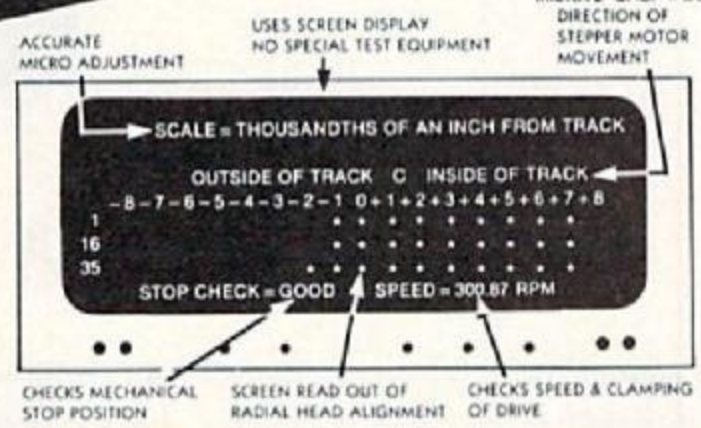
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By ROBERT SIMS

Telecomputing Workshop is a monthly column dedicated to the needs of RUN *readers who are using, or intend to use, a Commodore computer for telecommunications. We invite you to submit your questions to:*

Robert Sims
Telecomputing Workshop
c/o RUN *magazine*
80 Pine St.
Peterborough, NH 03458

Questions will be selected for publication on the basis of their probable interest to the majority of readers and will be answered only through this column.

Would you please tell me what telephone number to call to connect to the big services (CompuServe, The Source, etc.) and how much the telephone aspect of telecomputing will cost. Do they have "800" numbers? Are there local numbers one can call? Can you access them through AT&T, or do you need MCI or something else? I fear being zonked with a huge phone bill. Finally, do you need Touch Tone dialing, or will good old rotary dialing work?

Matthew Dyer
Augusta, ME

If you live in an urban area, connecting to one of these national services is just like calling your Aunt Hattie down the street. All of the national database services are connected to telephone networks that allow customers in urban areas to connect through a local number. AT&T, MCI and the other long-distance phone companies are not directly involved in the process. Since it's a local call, the question of whether you use Touch Tone or rotary dialing depends on which method your local phone system uses.

When you subscribe to a service, you'll be given a local phone number, called a node, which ties you into the national phone network. The cost of using this network is covered in the basic hourly rate charged by the service, so you shouldn't be billed separately for using it. (The charge for using the network is much less than regular long-distance rates.)

However, if you don't live in a major urban area, there may not be a local number, and you'll be given a number in the nearest city. If that city is long distance, you'll be paying long-distance charges to your local phone company in addition to the service's charges. You could end up paying up to $15 an hour to connect to the database service.

So, before subscribing to a national database service, call the service's 800 number to find out if it's a long-distance call from your home.

I received my first modem as a gift several years ago, and I've never been able to send or receive clearly. When I access databases and bulletin boards, I receive garbled and unreadable messages.

Using different terminal programs, I have tried the modem with my VIC, C-64 and, now, the C-128, with the same results.

I'm wondering if my problem may be due to my phone line. I frequently hear static and, sometimes, other conversations.

I would like to buy a new modem, but hesitate to spend any more money unless there is a cure for my problem. Any suggestions?

Leonora Crain
Wayne, NJ

Static or other voices on a phone line are bad for telecomputing and often cause modem signals to become garbled. But getting garbage all the time, as you describe, points to the modem rather than the phone line.

I suggest that you borrow a modem—one that you know is working—from a friend, and try it on your phone line. If it works reasonably well, then your modem is defective.

You can also turn the test around—have a friend use your modem on his system. If his transmissions turn to garbage, then, again, your modem is faulty.

Would you please provide information about transferring data via modem between a Commodore and a) another Commodore, b) an IBM PC and c) a Radio Shack Model 100. I want people who are away from the office to be able to use Model 100s to enter daily activity into a Commodore at the office.

Scott Rorex
Imboden, AR

First, you should know that, in an upcoming issue, *RUN* will be publishing a program that allows data transfer between your Commodore and the Model 100.

For the other aspects of your situation, as long as two computers are running terminal programs that communicate in standard ASCII, you can

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transfer text between them, regardless of make. Any terminal program worth having will tell you very clearly in the documentation whether it can communicate in standard ASCII.

However, to connect the remote computers with the Commodore in your office, you must do one of two things. Either somebody in the office must take the call and manually connect the office computer to the phone line, or your office computer must be equipped with an auto-answer modem and have software that's capable of automatically answering the phone.

I have the call-waiting feature on my phone; when I'm talking, a beep sounds to let me know someone else is calling. Will this signal interfere with my modem's functioning when I'm receiving data?

Edward Basner
Wynnewood, PA

The call-waiting feature is convenient for those who receive many phone calls, but it's a major headache for modem users. If you're lucky, the beep will only cause a few garbled characters; but in many cases, the beep interrupts the carrier signal that computers use to maintain their connection. It happens all too often that the software in one of the computers will treat the beep as a lost connection and will hang up. You have two choices: Have the phone company remove the call-waiting feature or install a second phone line for modem use.

Commodore's latest modem, a 1200-bps unit, comes with software to make my C-64 perform as a remote terminal. Is this terminal-emulator package what I need for off-campus connection to the computer at my university? Terminal time is at a premium, what with business concerns time-sharing on the school's computer.

John Johnson
Detroit, MI

It's good that you're a student, because you have some research to do. Connecting a home computer to a mainframe is not a simple task.

First, find out if the school's computer transmits data at the same speed as your modem. If the modems work at different speeds, you're in trouble.

Next, find out from the school's data-processing department whether your modem's terminal program will work with their system. If you're lucky, you'll only need some documentation on how to log onto the school's computer and how to send and receive data. If the school computer only communicates with special software, then your modem's terminal program won't work.

While you're at it, make sure that using a remote terminal will cost less than using one of the school's terminals. Since there's considerable expense involved in setting up and maintaining a telecommunications link to a computer, you may pay more to call the school computer from home than you would to use a terminal on campus.

I used Perfect Typist to enter your ML Perfect Typist because I want to type in your terminal program, Runterm Plus. However, for some reason, I could not run ML Perfect Typist properly. When I run it, a line of dots appears. If I stop the program by pressing the run/stop key, the screen displays, "Break At Line 10." I checked the program and didn't detect any errors. Is there any bug in the program?

Manh Huu Vu
Hamilton, Ontario
Canada

There is no bug. The dots fill the screen to let you know that the program is running, while the Basic portion of ML Perfect Typist transfers the machine language portion of the program from the Data statements to their proper place in memory. If you press the run/stop key while the machine code is being loaded, you will receive a Break in Line 10 error message because line 10 of the Basic portion contains the Read loop, which moves the machine code.

Once the program configures itself, you should get the opening screen as described in the ML Perfect Typist article. If you don't see this screen, then you should check your version of the program against the magazine listing.

I have a problem with ML Perfect Typist, which I typed in from *RUN*'s December 1985 issue. When I run the program, I get an Out of Data error in line 10. What's wrong?

Donald Smith
Aurora, IL

The computer displays this error during a Read loop when there aren't enough elements in the program's Data statements. Be sure to include all the lines containing Data statements; it's easy to leave one out. Also, be sure that every number (except the last) in each statement is followed by a comma.

Can you tell me the names of some inexpensive BBS programs? My club wants to start up its own bulletin board.

M. Gorts
Maynard, MA

There are many good-quality bulletin board programs that you can get without spending a lot of money. HAL and Kermit are two such BBSs, and you can download these from most of the major information networks, like CompuServe, Quantum-Link or Delphi.

To locate public domain (free) BBS programs on these networks, just go into the telecommunications or BBS database of the Commodore SIG, and you'll see a list of the BBSs available. Simply download whichever one you want.

There's a lot of low-cost BBS software (less than $75) available, but it doesn't often get advertised, because the programmers aren't associated with the larger software firms that can afford national advertising. However, you can find out about many of these low-cost programs by, again, going on-line. You should check out the vendor/shopping sections of the Commodore SIGs for descriptions, prices and ordering information. R

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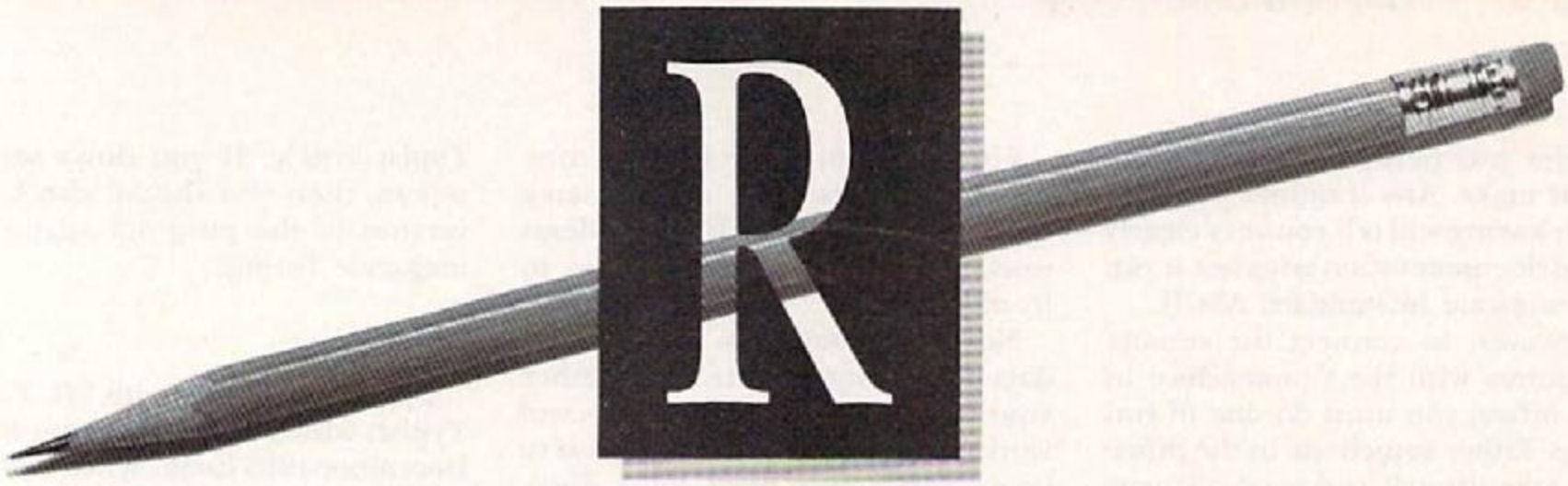

By MARGARET MORABITO

This month—two Commodore support services; Commodore's third-party developers; the Young Astronaut Program; new online education SIG.

I often get questions from people wanting to know what Commodore actually does to support education. Recently, I spoke with Commodore's key educational people to find out what the company is doing in this area.

Many educators have asked whether or not there are support services for teachers using Commodore computers. Pat Walkington, Manager of Educational Marketing at Commodore headquarters in West Chester, Pennsylvania, told me that Commodore does indeed provide a good deal of teacher and system support. They have two primary service support programs to help schools set up their own computer classes and maintain their equipment.

Commodore-Authorized Education Dealers

Commodore has over 100 authorized education dealers across the nation. (A list of them is included at the end of this column.) These dealers have personnel trained to handle school needs. They can advise schools as to what Commodore hardware they need to buy and recommend the software appropriate for particular courses.

In addition, these dealers are all required to have a Commodore service department, so a school that purchases equipment from one of them can rely on that dealer for service and maintenance.

Commodore gives these dealers special hardware discounts, which are then passed on to school customers. Educators are thus better off buying from these dealers than from mass merchandisers, because of both the low prices and the support services they so badly need.

School Service Program

What about those schools in remote areas that don't have a local authorized education dealer? What do they do? To address this problem, Commodore implemented their School Service Program last year.

This program is run from Commodore's West Chester headquarters. Any school district or regional service agency (such as BOCES in New York) is eligible for training in the maintenance of its Commodore equipment. The training is free, but the school district or agency must pay for travel costs and the training materials used.

After the service training, your staff member can order parts for the school's equipment directly from Commodore or from any authorized education dealer.

To qualify for this training, your school district or regional service agency must own at least 100 Commodore products. This may include computers, disk drives, monitors and other peripherals.

Pat Walkington told me that there had been tremendous response to the School Service Program from school districts across the country. The classes are always filled. Each training session, by the way, lasts for a day and a half, and new sessions are held monthly.

For more information on the School Service Program, contact the Education Department, Commodore Business Machines, 1200 Wilson Drive, West Chester, PA 19380, or call 215-431-9100.

Support for Third-Party Software Developers

In addition to these two service programs for schools, Commodore also encourages continued production of quality C-64 and C-128 educational software through its support of third-party software developers. Much of this support comes in the form of promotional efforts. At education conferences, Commodore invites software producers to exhibit their products in its booths and provides computers so they can demonstrate their software at their own booths.

Commodore also advertises third-party software, and is currently distributing a new list thereof at educational trade shows. This list comes directly from EPIE (Educational Products Information Exchange) and includes a description of each program, along with its title, subject matter and appropriate grade level. The computers covered are the C-64, the C-128 and the new PC-10, which is IBM-compatible.

Another new project involves the

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Photo 1. Students at the Winchester elementary school (see Feb. 1986 issue).

bundling of educational sampler disks with its C-64s and 128s. This directly benefits every new user. Commodore is putting some of the best software from the educational market on these disks, so you can see what a commercial educational program does before you buy it.

They are beginning this new project with samples from MECC (Minnesota Educational Computer Consortium), which makes approximately 22% of all educational software now in the schools.

Young Astronaut Program

Commodore also contributes to education by sponsoring national education projects. A major example of this is Commodore's backing of the Young Astronaut Program. I spoke with Dr. Daniel Kuntz, former director of Commodore's Education Division and now on loan from Commodore to act as the national launch director of this program.

According to Dr. Kuntz, there are over 5000 chapters of Young Astronauts throughout the U.S., representing about 20% of all of the nation's school districts. There are also 34 chapters in foreign countries. Commodore's sponsorship of this program includes promotional efforts, donations of equipment and software and developmental costs for software products and curriculum materials.

What is The Young Astronaut Program? It was developed to encourage the study of mathematics, science and technology in elementary and junior high schools. The program supplies curriculum materials and project ideas to help teachers integrate the study of math and science into non-technical subjects such as language arts, history, social studies and art. The materials also enhance existing math and science courses. The theme behind many of these curricular materials is our exploration of space.

Teachers will be interested in the fact that membership in the Young Astronaut Program costs only $20 per year per chapter (with up to 30 members each), and for this fee they receive lesson plans, wall charts and other helpful teaching aids. Members get a monthly newsletter concerning our space program, activities of other chapters, contest information and sponsored field trips to launches and summer camps.

There is also an on-line information network, AstroNet, which members can log onto without charge. AstroNet is accessible through Tymnet and includes features such as monthly space updates from the National Space Institute, a serialized space story called "Space Camp Alpha" and chapter news.

Commodore has also developed software for the Young Astronaut Program. Dr. Kuntz mentioned a new program, Word Shuttle, which is an icon-based word processor for elementary school students.

If you're interested in more information on the Young Astronaut Program, you should contact the Young Astronaut Council, PO Box 65432, Washington, DC 20036.

The Resource Center On-line

I receive letters from teachers, parents and community groups all across the U.S. and Canada who are using Commodore computers for educational purposes. You all have interesting and important contributions to make, and I would like to share

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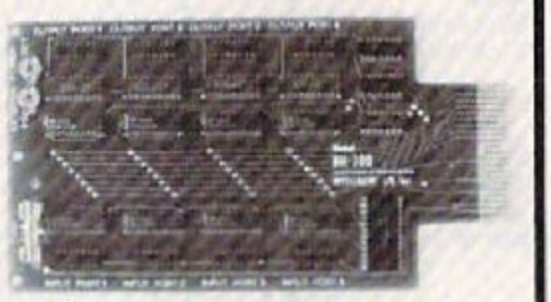

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Photo 2. Students using C-64s in the Augustana College music lab, as described in the May issue.

all of your experiences with others through The Resource Center.

Because there's been so much interest in The Resource Center and because we're limited to only 12 columns a year, I am using telecommunications to get information out to you more quickly. The Resource Center will now also be on QuantumLink for those of you who want to communicate via modem with others who are using Commodore computers for education.

This on-line education SIG (special interest group) will be an extension of The Resource Center in *RUN* magazine and will act as a clearinghouse of information from you, from Commodore, and from national and state education departments. The information will apply to all educators who are looking for advice on how to use computers in the classroom, at home, and in the community, and it will specifically address Commodore computers.

There will be a software library for downloading programs that have been written and tested by educators; public message boards for asking questions, giving answers and otherwise sharing information; and databases of articles and reports on computers in education. There will also be regular on-line conferences, run by myself and guest speakers, in which you can all participate.

If you'd like to contribute your own materials to the software and article databases, please send them to me on disk here at *RUN*. All programs should include the intended user's age or grade level, the subject area covered and how you have been using the programs in your school or home.

Articles (without programs) that discuss your experiences using Commodore computers for education should be sent on disk as a Commodore word processor file.

All materials should include your name, the name of your school and an address. That way, if you don't have a modem, people can contact you via regular mail. (For those of you who already have a modem and are members of QuantumLink, you can upload files to me on-line.)

The materials you contribute will benefit a great many people, will be considered part of the public domain and will be made available only through The Resource Center. We cannot pay for these materials.

I encourage all of you to join this on-line SIG and to continue to contribute your experiences and advice to The Resource Center—whether in *RUN* or on-line. For information about QuantumLink, contact Quantum Computer Services, 8620 Westwood Center Drive, Vienna, VA 22180.

More calls for help

By the way, I am getting many requests for curriculum guides to help schools start integrating computers into their courses. Some of you have already sent me copies of what your school is using. I would like to collect as many curriculum guides as possible, to share with other interested schools. If you've created a guide that you'd like to share with others, please send me a copy.

Also, I'd like to include more photos of students using Commodore computers for education. Please send along such photos and a brief description of the software and the Commodore hardware system being used. I'll try to include these in The Resource Center whenever possible. R

If you are using Commodore computers for educational purposes (at home or at school) and would like to share your experiences through The Resource Center, write me a letter detailing the equipment you're using, the subject areas involved, the age or grade level of your students, software you have found effective and any other information you feel like including. Send letters to:

Margaret Morabito
The Resource Center
c/o RUN *Editorial*
80 Pine St.
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You can also leave messages in my on-line mail boxes: CompuServe (70616,-714), Delphi (MARGM) and QuantumLink (MARGM).

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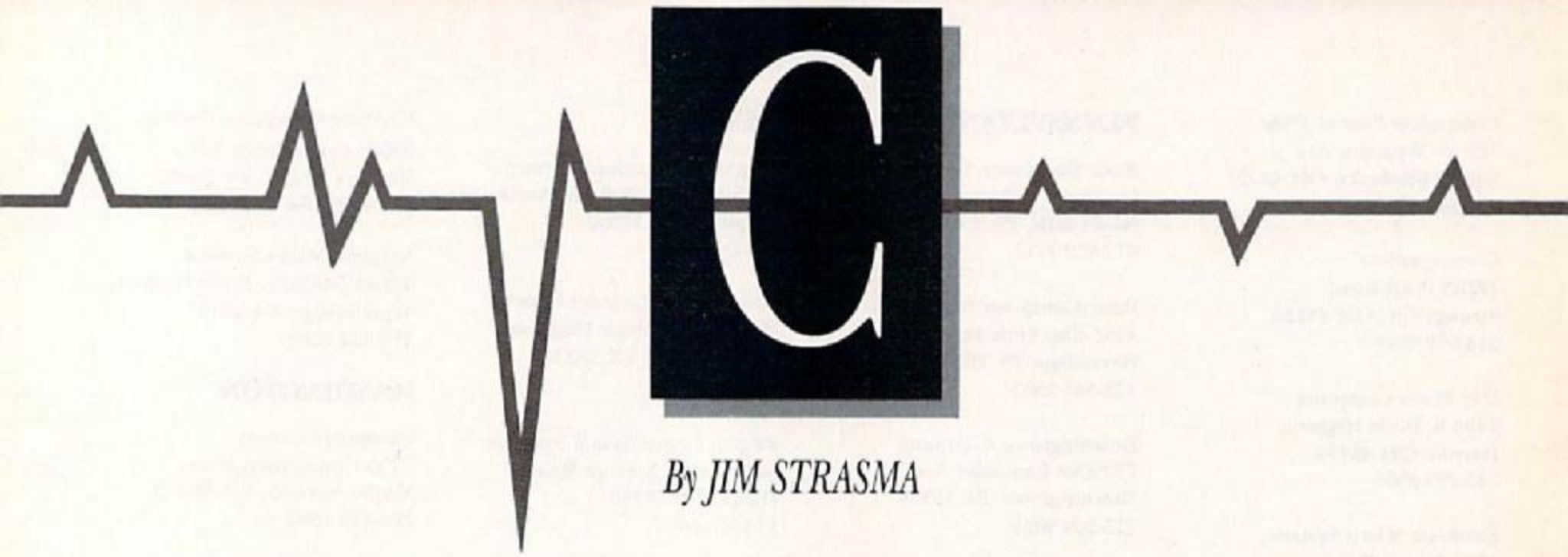

By JIM STRASMA

Do you have a problem or question about your Commodore computer? Commodore Clinic can help. Just send your question on a postcard *(limit of one question per card) to:*

Jim Strasma
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Queries are answered only through this column, and, due to the volume of mail, only questions likely to appeal to the majority of our readers can be published.

HARDWARE

***Q:** In examining three of the latest versions of the 1541 disk drive, I found that one had a 6502 chip, another a 6502A and still another a 6502B. Can these be interchanged? And is it all right to install CMOS chips for the 6502 and 6522?*

Earl Long
Joplin, MO

A: Commodore's service manual for the 1541 simply specifies that the 1541 has a 6502, so any of the three versions should work. The A or B at the end of the number indicates that the chip can be used at higher-than-standard clock speeds—two and three MHz, respectively.

As for CMOS substitutes, that is definitely a current trend in the industry. CMOS chips use less power than traditional NMOS chips. Since some 1541s tend to run hot, this can be an important substitution; CMOS chips save about 3 watts of heat in a typical 1541, according to one supplier, K. Boufal of 244 Fitzwater St., Philadelphia, PA 19147 (215-925-6469).

This supplier's recent price for a set of two CMOS 6522s and a 65C02 was $40. Although the new chips are plug-in replacements for the ones now in the 1541, be aware that some copy-protected software may object to the change—particularly to the added commands offered by the 65C02.

***Q:** I am trying to connect Radio Shack's Armatron robot arm to my C-128. Could you send me directions on how to do so? I know a little about the user port and how it works.*

Evan McNish
Findlay, OH

A: I bought an Armatron a year ago, hoping to do exactly the same thing. Unfortunately for both you and me, Armatron's magic is wrought entirely by mechanical gears, not electronics. Worse yet, its very crowded interior does not appear to include enough room for the several solenoids that would be needed to control it electronically.

If you want to try anyway, I'd suggest you start on something less complex. One company that offers a robotics experimenter's board for Commodore user ports is Kobetek Systems, of 1113 Commercial St., New Minas, NS, Canada B4N 3E6. One suitable project for it might be Radio Shack's new Battle Claw radio-controlled tank. It, too, includes a simple robot arm, with the advantage of electronic remote control.

***Q:** I have a Commodore B-128 system, which includes an 8050 dual disk drive. Since I intend to buy a C-128, I would like to know if I can copy data from the 8050 to the 1571 disk drive.*

John Gentilucci
San Francisco, CA

A: Sorry, but you can't do it without buying or borrowing additional equipment. The 8050 has an IEEE-488 interface, and the 1571 has a serial bus interface. The two are similar in function, but not directly compatible.

The simplest way to go between the two formats may be to find access to another drive, preferably the MSD, which accommodates both interfaces. You can then connect the MSD and the 8050 to your B-128. Commodore supplies a unit-to-unit copy program with the 8050 that should be able to copy your files from the 8050 to the MSD. However, you may need to alter the program to work on the B-128, as it was written for the 8032.

Once the files are on the MSD drive, you can run Copyall64 or an equivalent program to copy them into the 1571. If you prefer, you may also put the MSD disk in the 1571.

***Q:** I was going to buy a C-128 computer and a 1571 disk drive until I heard rumors that the 1571 shares the same bug as the 1541 in regard to the @ Save command. Is this true?*

John Menke
Mt. Vernon, IL

A: The bug apparently does not exist in the 1571, but I suggest you don't

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even use the @Save command. On the C-128, scratch any file you wish to replace and then Dsave normally. (Owners of other models can use equivalent Basic 2 commands.)

PROGRAMMING

Q: On p. 16 of my 1541 user's manual (part number 1540031-2), there is a format to combine files. I simply cannot get this to work.

Barry Ashworth
Tucson, AZ

A: In the current 1541 manual (part number 1540031-03), which you can purchase for $5 directly from Commodore, I describe on p. 37 how to combine several already-existing sequential datafiles on the same disk.

Assuming there are three files to be concatenated ("AG", "HM" and "NZ"), each containing the words from part of a short dictionary, the commands to combine them into a single dictionary file ("AZ") are:

```
10 OPEN 15,8,15
20 PRINT#15,"C0:AZ=0:AG,0:HM,0:NZ"
30 INPUT#15,EN,EM$,ET,ES
40 IF EN THEN PRINT EM$:STOP
50 CLOSE 15
```

(Line 20 does most of the work, but lines 30 and 40 are needed to alert you to any problems that arise during the process.)

Unfortunately, this method of concatenating files is only intended for use on datafiles, not program files.

Q: I'd like a C-64 DOS Wedge program that would direct commands to disk drive #9. Any suggestions?

Margaret Matthews
Dallas, TX

A: Load and run the DOS wedge on your demo disk normally. Then simply type @#9 to shift succeeding commands to disk unit 9. This will remain effective throughout your current computer session unless you choose to change it again.

People writing about the DOS wedge on the C-64 often miss this command, because it was added after the original PET version.

REPAIRS

Q: I own a C-64 and use two joysticks. About a month ago, one of the joysticks began malfunctioning; when I push it to the left, nothing happens. I know that the problem is either in the port itself or in the 6526 to which it is connected. How much would it cost to replace one or both, and where would I find them?

Stephen Legate
Los Alamos, NM

A: The problem is probably in the joystick. Remove the screws from the base of the joystick and open the case. Slightly bend the contacts on the inside to get a good circuit and reassemble.

If the joystick checks out all right, get a continuity tester, or ohmmeter, and check for continuity between the pins of port 1 and the pins of the 6526 at U1 on your circuit board. Use the schematic in the *Commodore 64 Programmer's Reference Guide* to be sure which pins should match.

If there is continuity for each pin and no electrical shorts, then the port itself is all right. If continuity is not present, check the solder connections to the main board.

Usually, it is the 6526, not the main board, that is damaged. The damage occurs when the joysticks are inserted with the power on or when the port is touched by a bolt of stray static electricity. If you must replace the 6526, see your nearest authorized Commodore service center, or you can order one for $20 from K. Boufal (mentioned under this column's hardware section, above).

SOFTWARE

Q: I recently bought an Enhancer 2000 disk drive. It works perfectly except that a few programs fail to load, such as Ultrabyte Disk Nibbler V2.0, the Keymaster from Megasoft, and Gemstone Warrior from SSI. I suspect the old "different DOS" problem. If this is the case, can I solve it by using StarDOS from Starpoint Software? It is supposed to be 100% compatible with all C-64 software, and I know Starpoint sells a version for the Enhancer 2000.

Derek Yamamoto
Kailua, HI

A: Unfortunately, StarDOS cannot solve your problem. Even if it completely duplicated Commodore's ROM DOS, it would violate Commodore copyrights, so you can be sure that some programs, such as the ones you mentioned, will still fail to run on your Enhancer 2000, with or without StarDOS.

Q: Where I work, I am used to programming Z80s with a multi-pass assembler. I recently bought a C-128, but I cannot find a multi-pass assembler anywhere. Are there any?

Erik Skyten
Nashua, NH

A: Yes, there are several two-pass assemblers for Commodore computers, and the one I use most, MAE, even offers a third pass to create relocatable object code. It is in many respects equal to the IBM mainframe assembler used here at Western Illinois University.

Unlike some otherwise excellent competitors, MAE is not copy-protected. To order MAE, send $60 to Eastern House Software, 3239 Linda Drive, Winston-Salem, NC 27106.

Q: I need a C-128 program to prepare a drawing or to plot a plan from the description of real estate in deeds and other legal documents. The program should be able to prepare a hard copy of the perimeter of the tract, print the scale of the drawing, the courses and distances of each side, a north indication, and, in the event the description does not close, a closure error. Perhaps you or a reader would be aware of such a program.

Martin Reiley
114 S. Juliana St.
Bedford, PA 15522

A: CadPak, from Abacus Software, is the first package I've seen for the C-128 that might help. It uses simple commands to draw perimeters, a line at a time, and is able to add to the drawing text that describes each line. However, it won't do everything you ask in a fully automatic fashion, so perhaps a reader knows of another program more directly suited to your request. If so, I'd like to hear, too, as yours sounds like a very useful application for the C-128. R

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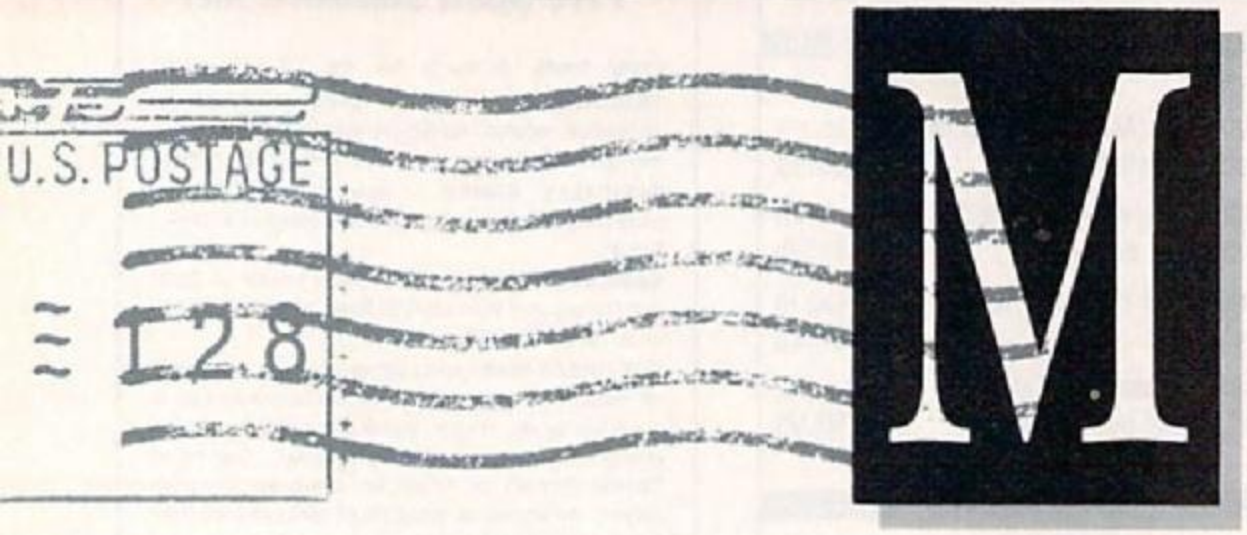

By the Way

I am a new subscriber to your magazine, though not a new reader; a coworker friend of mine has let me read her copies.

I've owned two Timex computer systems in the past few years, and it was largely due to your fine magazine that I decided to switch to Commodore, with the purchase of the C-128 and its associated peripherals. It is an excellent machine for the money.

I am writing mainly to comment on Bob Guerra's review article on productivity software for the C-128 (*RUN*, March 1986). Having purchased all three of the Timeworks programs mentioned in Mr. Guerra's report, I must say that I am glad I made the right choice. I was hoping to purchase the Perfect series that has been promised for so long, but I felt the delay in release was intolerable.

The only criticism I have of Mr. Guerra's report is that he failed to mention one feature of the Timeworks programs that I feel makes them most useful—that they will interface with each other. And in the case of the SwiftCalc program, the Sideways feature can be used with other non-Timeworks software, such as Microsoft Multiplan, Creative Calc and Calc Now, or any that are capable of creative text files in ASCII format.

Richard Ashley
Portsmouth, NH

A Welcome Response

In regard to my article, "Making the Video Connection" (January 1986), I've received phone calls, letters and sample programs from all over the country. These people seem to think I have time to chat with them and to answer their queries—and they're exactly right! I enjoy doing it.

This, I think, is more a tribute to *RUN* than to me. It happens because you and the others at *RUN* have replaced the arcane computing priesthood—open only to adepts—with a kind of camaraderie that makes a reader certain that he or she can call a stranger at the other end of the country and find a kindred soul to talk with.

I think there are a lot of us who feel this way, although we may not always remember to express it. So this is my expression of it. Keep it up.

Erv Bobo
St. Peters, MO

Make a Friend

I am looking for a pen pal with whom to swap games, magazines, tips, etc. I am male, 17 years old, and my main interests are computers, telecommunications, games and utilities.

Amber Butt
702 Bolton Road
Pendlebury
Manchester M27 2EL
England

Call to VIC-20 Owners

I am trying to start a mail-in computer club for VIC-20 users. The club will have great potential. Eventually, I would like it to have its own BBS. I have already made plans for a newsletter, which will include information from people who write to me, as well as reviews of hardware and software. There will probably be a small sign-up fee.

I am interested in hearing from those who have ideas on what they'd like this club to offer. Those interested can write to me. (Please include a self-addressed stamped envelope for a response.) I promise to answer all letters.

Blair Fraser
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Computer Users Unite

Many perceive mankind's present environment as one of mutual terror. Others deem that such an atmosphere is deplorable. Some hypothesize that we need to build for real peace (e.g., by sports and exchanges). They reiterate that we must increase understanding or contact.

To assist in achieving that goal, two international home computer groups have been formed. Both consist of PC enthusiasts and computer-niks. Most members are hackers/programmers.

The groups, which are made up of a mixture of people, are located in Warsaw and Kracow, Poland. Essentially, we are interested in home computer ideas. Because most members are bilingual, old computer newspapers and magazines are relished. Club members exchange ideas with user's groups from around the world.

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Kossecki (02-757 Warsaw, ul. Burgaska 3/24/1, Poland) or Andrew Wiechowski (31-279 Krakow, ul. Lokietka 47/38, Poland) or me.

Benjamin Chapinski
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Prisoner of *RUN*

I am a condemned man.

I peck away at my C-128 keyboard like a chicken scrambling for scattered corn.

The shame of it all is that you are to blame for my new condition, having published those troublemakers—64 Perfect Typist, 128 Perfect Typist and ML Perfect Typist. These three utilities have created in me such an insatiable desire for programs that I am not satisfied until I have typed in all of the *RUN* magazine programs at hand.

It is up to you to keep me from having withdrawal pains—by supplying me with more programs. I have visions of *RUN* magazine becoming thicker and thicker until it gets as thick as a Sears catalog. At that time, I expect my fingers will be just stumps. Nevertheless, keep the programs coming, especially educational types.

Antonio J. Benevenutti
St. Thomas, Virgin Islands

C-64 vs. C-128

After rereading my February *RUN*, I decided to write a note. I have the C-128, 1902 monitor and 1571 disk drive. I am glad to see you are beginning to have more articles for the 128 instead of for the 64.

Robert Wessel
Old Hickory, TN

Compared to past issues, your magazine appears to be taking a sharp turn away from covering the 64. I know that you must cover the C-128, but I don't think it's necessary to turn C-64 owners out in the cold.

Alex Perez
Winter Park, FL

We agree, Alex. As we said in the May issue, given the excitement created by the introduction of the C-128, it was tempting to fill the magazine with useful information about the features of this new machine. However, we realize that the larger reader base consists of C-64 owners, and the majority of our editorial coverage will address this group.

Since the introduction of the C-128, a little over a quarter of our editorial has been C-128-related. We feel that this is in keeping with the existing user base. RUN *will continue to be the magazine for C-64 owners, while, at the same time, introduce C-128 owners to the features of their new machine.*

Editors

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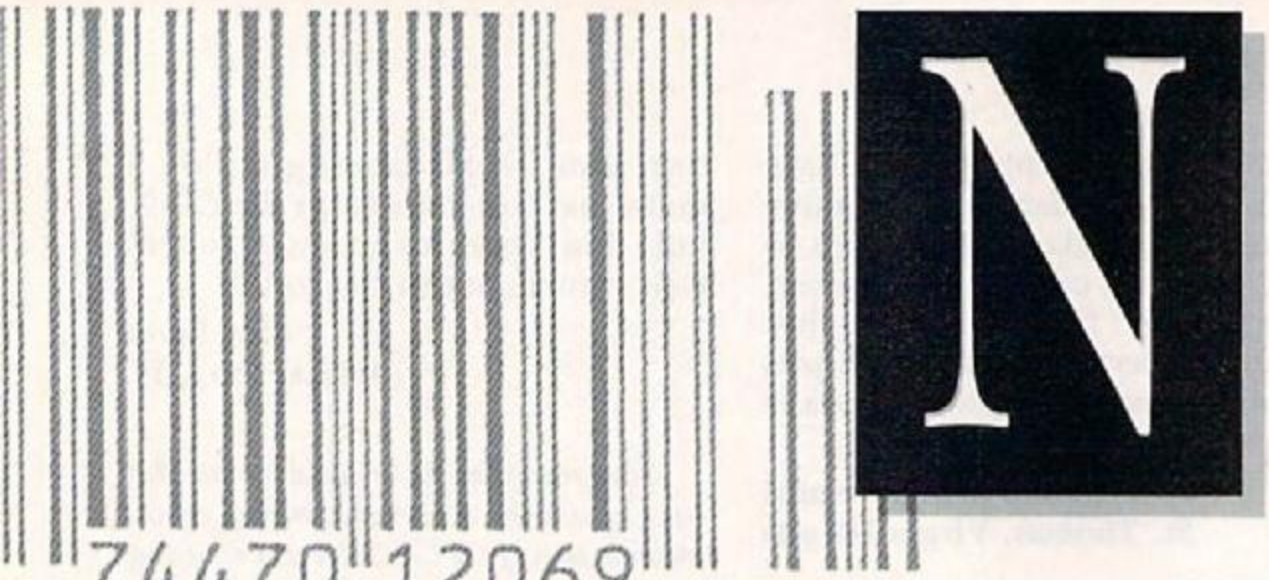

Compiled by HAROLD R. BJORNSEN

Partner 128

Timeworks (444 Lake Cook Road, Deerfield, IL 60015) has released Partner 128, a collection of desktop organization accessory programs for the C-128.

The programs include: a business calculator, memo pad, appointment calendar and datebook, typewriter, address book, phone book and screen print accessory. Partner 128 is available on disk for $59.95.

Check Reader Service number 403.

—•—• —•—• —•—• —•—•
—•—• —•—•

Uncle Bill's Code Course is a three-part Morse code tutorial for the C-64. As you advance through the course, the computer's audio/visual capabilities introduce you to each Morse code character, drill you in responding to Morse code characters and help you practice your response speed to messages in Morse code. The Code Course is available on disk for $9.95. Uncle Bill's Software, PO Box 2403, Falls Church, VA 22042.

Check Reader Service number 404.

Jeu de Mots

If you want to enlarge your French vocabulary, Gessler Educational Software (900 Broadway, New York, NY 10003) has released French Micro Scrabble, based, *cela va sans dire*, on the popular board game. Up to four players can compete against one another, or you can play against the computer in one of four skill levels.

If you want an English translation of the French phrases in this announcement—sorry—you'll just have to learn French. Available on disk for the C-64 for $39.95.

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Out-Think

Kamasoft (2525 SW 224th Ave., PO Box 5549, Aloha, OR 97007) introduces Out-Think, an outline processor for the C-128 in CP/M mode.

Out-Think lets you classify text into an outline structure and then alter and access the text. It allows you to focus on how your main ideas fit together as you create and develop your ideas.

In addition, Out-Think offers a full-screen text editor for inserting and editing text in the outline. A full complement of copy and move operations are provided, including copying within and between outlines. The program requires at least one 1571 disk drive, and it is available on disk for $49.95.

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I Am Your Robot

Multibots (Multibotics, 2561 South 1560 West, Woods Cross, UT 84087) are a new line of electronic-robotic experiment and construction sets for the C-64 that, among other things, teach the principles and theory of computer-controlled robotics and facilitate experiments and projects in speech and audio digitization. Multibots also allow you to create hundreds of projects and devices. The sets range in price from $59.95 to $199.95.

Check Reader Service number 414.

Hup! 53281 + 54272

Math Football (Gamco, PO Box 1911, Big Spring, TX 79721) combines football action, whole-number drill and a student/program management system that one or two students may play in a choice of four playing levels: addition and subtraction, multiplication, division or mixed operations. On each play, students may choose among easy, medium or difficult problems.

The program management system allows you to adjust the total playing time and set time limits for answering problems. The student management system records students' names, playing levels and number of problems answered correctly in each category of difficulty. Available on disk for the C-64 for $39.95.

Check Reader Service number 415.

General-Purpose I/O Card

Intelligent I/O (30 Lawrence Ave., Potsdam, NY 13676) has released its BH100 General-Purpose I/O Card for the C-64, C-128 and VIC-20 computers.

The card, which plugs into the memory expansion port, allows you to control lights, appliances, heating or cooling systems, relays and motors. It connects to the manufacturer's a/d and d/a converters and to temperature, light and sound sensors. The I/O card can also control robots and security systems. Available for $129.

Check Reader Service number 411.

Commodore Coloring Book

Mindscape (3444 Dundee Road, Northbrook, IL 60062) introduces

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Screen shot of Jet, from SubLogic.

Colorme: The Computer Coloring Kit, which allows young children to design pictures, coloring books and stickers on the C-64 and then print them out. The kit also includes a Rainbow Brite picture disk. Available on disk for $34.95.

Also available are Colorme Picture Disks featuring Shirt Tales, Hugga Bunch and Tink!Tonk! characters, and the Colorme Supply Box, which comes with assorted buttons and color printing papers. The Picture Disk and the Supply Box are $9.95 each.

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Teacher's Aide

The Teacher's Aide, from T'Aide Software (PO Box 65, El Mirage, AZ 85335), lets you print out exercises in basic mathematics and algebra with your C-64 and compatible dot-matrix printer.

The basic mathematics programs feature all operations applicable to integers, decimals, fractions and percent; the algebra programs include linear equations with one or two variables, quadratics, fractional equations and signed and complex number arithmetic. Available on disk for $100.

Check Reader Service number 413.

Into the Wild Blue Yonder

Jet is a flight simulator for the C-64 that simulates two fast and maneuverable supersonic jet fighters: a land-based F-16 fighting Falcon and a carrier-based F-18 Hornet.

The program includes a free-flight noncombat mode and offers a variety of land and sea strike and dogfight options to test your skills under different combat conditions.

The aircraft are equipped with "heads up" displays for monitoring instruments and environment simultaneously, and the displays provide you with full-screen, out-the-window views. Jet is compatible with all Scenery Disks and is available on disk for $39.95 from SubLogic, 713 Edgebrook Drive, Champaign, IL 61820.

Check Reader Service number 410.

128 Software

Free Spirit Software (5836 S. Mozart, Chicago, IL 60629) has released C-128 versions of two of its software packages.

Basically Simple 128 is for programming in Basic and includes instructions in the use of the additional commands available on the C-128. On disk for $19.95.

Postmaster 128 stores, retrieves and sorts names, addresses, Zip codes and phone numbers. It also takes advantage of the 128's increased storage capacity. Available on disk for $9.95.

Check Reader Service number 406.

Organ Recital

Inside Story—The Anatomy Learning System, from Access Software (#A 2561 South 1560 West, Woods Cross, UT 84087), allows students to study human physiology and view specific organs or parts of the body on 50 high-resolution screens.

Multiple-choice quizzes and final exams allow you to test your students and store and print out test scores. Available on disk for the C-64 for $34.95.

Check Reader Service number 407.

Commodore Chemistry

Chem Lab puts young chemists ages 9–12 in command of a chemistry laboratory on their C-64s. The program contains 50 experiments involving thousands of chemical combinations.

In each experiment, students mix, heat and combine chemicals on screen in order to solve chemistry problems. Available on disk for $39.95. Simon & Schuster, 1230 Avenue of the Americas, New York, NY 10020.

Check Reader Service number 408.

How Would You React?

Alter Ego (Activision, 2350 Bayshore Frontage Road, Mountain View, CA 94043) is a role-playing game in which your C-64 poses questions about life outside your realm of experience. You answer as you think another person might, or you give your own answers. The program then tells you the outcomes of your responses. Available on disk for $49.95.

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Sample fonts, from xetec.

Weird Characters

Fontmaster II, an improved version of the original Fontmaster word processor from Xetec (2804 Arnold Road, Salina, KS 67401), has 30 different print styles for your C-64.

In addition, it has over 65 text-editing commands, a grid for creating characters, on-screen status display, 80-column video preview, help screens and right-to-left editing features for use with foreign languages. Available on disk for $49.95.

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Learn to Walk Before You RUN

We receive many letters from new Commodore owners who want to learn the first steps in using their computers. For these first-time users, we present the following step-by-step list of things that all beginners should be aware of as they start typing in programs.

1. Before you can use a fresh disk, you have to format it. First turn on your disk drive, then insert the disk, close the latch and type:

```
OPEN15,8,15 <Press Return>
PRINT#15,"N0:NAME,##" <Press Return>
```

The ## is a two-character identification number that can be any combination of letters and/or digits. "NAME" can be any title for your disk that you choose, but it must not exceed 16 characters. Wait for a few minutes while the disk spins inside the drive, being formatted. When the disk stops spinning, type:

```
CLOSE15 <Press Return>
```

C-128 owners can shorten this procedure by simply typing:

```
HEADER "NAME,##" <Press Return>
```

Caution: The formatting process erases all material already on the disk, so if you're formatting a used disk, make sure it doesn't contain any programs you want to save. See item 7, below, on reading the disk directory.

2. As a beginner, you should start entering short Basic programs. Avoid machine language listings and very lengthy Basic programs until you get the hang of what you're doing. We have a checksum program (Perfect Typist) which actually proofreads your typing and tells you when you make a mistake. You should type in Perfect Typist before you enter any programs. See directions below.

3. Remember to press the return key after each programming line you type in.

4. As you are typing in a program, you are likely to make typographical errors. To check what you have typed in, you'll need to list your program's lines on the screen. You can specify the exact lines that you want to see. Typing LIST 10–50 will list lines 10 through 50. LIST 20 will list only line 20. If you see an error in one of your listed lines, you can fix it by using the INST/DEL key and retyping the incorrect section of the line. Always press the return key after you have fixed a line.

5. Be sure to save what you have typed in before turning off your computer. To save any partial or complete Basic program listing to your disk, type:

```
SAVE "NAME",8 <Press Return>
```

C-128 owners can press F5, type in the program name, and press the return key.

Note: As you save subsequent versions of the same program, you need to make a slight change in the program name each time. You might simply add version numbers to the end of the program name (PROGRAM.1, PROGRAM.2, etc.).

6. While working on a program, you may develop several versions before you're satisfied that you have it in final form. After you *do* achieve that final version, you might want to go back and erase the old, incomplete versions from your disk. Erasing unwanted programs is called scratching. (Be sure not to erase your final version!) To scratch a program, type:

```
OPEN15,8,15 <Press Return>
PRINT#15,"S0:prog.name" <Press Return and wait a few seconds>
CLOSE15 <Press Return>
```

7. After you have saved several programs to your disk, you will need to see their names so that you can load the one you want. To get the complete list (the disk directory) of all the program names on your disk, type:

```
LOAD "$",8 <Press Return>
```

Then type LIST to actually see the directory. C-128 owners simply press F3.

8. When you know what program you want to load into your computer, type:

```
LOAD "NAME",8 <Press Return>
```

C-128 owners can just press F2, type in the program name, and press the return key.

9. After you have loaded a program, type RUN to actually use the program.

How to Type Listings from *RUN*

To simplify your typing of *RUN*'s C-64 and C-128 program listings, we include checksum numbers. These numbers follow a REM statement at the end of each line (e.g., :REM*123). These checksum numbers necessitate your using *RUN*'s Perfect Typist programs, listed below. Use 64 Perfect Typist for C-64 programs and 128 Perfect Typist for 128 Mode programs on the C-128.

Type in 64 Perfect Typist (Listing 1) or 128 Perfect Typist (Listing 2) and save it to either tape or disk before running. When you want to type in a 64- or a 128-mode program, first load and run the appropriate Perfect Typist listing. Two SYS numbers will be displayed on your screen. Jot these down and keep them handy. They are the SYS numbers that you type in for deactivating and reactivating the checksum program.

After Perfect Typist has been loaded and run, start typing in the program listing from *RUN* as you normally do. The only difference is that now, after you press the return key to log in each line, a 1-, 2- or 3-digit number will appear below the line on the left margin. This is the checksum number, ranging from 0 to 255.

If this number matches the checksum number printed in the listing after the :REM*, then you know you have typed that line correctly. Then you type the next program line right over the previous line's checksum value. If the checksum numbers do not agree, analyze your line on screen for any typographic errors or omissions. Make the needed changes and press the return key again to log in those changes. A new checksum number will appear in place of the old one. Compare this to the magazine's number and then proceed to the next line.

When you've finished typing in your program, disable the Perfect Typist by typing in the appropriate SYS number for either 64 or 128 mode, and press the return key. Now you can save your program as usual, to disk or tape. (Before you attempt to run your new program, turn your computer off and back on to completely clear out the Perfect Typist program.)

You may save an incomplete program any time and continue it later. You will have to reload and run the Perfect Typist program, then load the incompleted pro-

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gram that you were working on, list it, and continue where you left off.

The 128 Perfect Typist will work in either 40 or 80 columns. Also, it lets you use the C-128's automatic line-numbering. If Auto is on, the checksum will be printed below the line you just entered, and the C-128 will place the next line number below the checksum.

All listings in *RUN* have been translated so that the graphics and control characters are designated as understandable key combinations. When you see instructions inside curly brackets, such as {SHIFT L}, you should hold down the shift key and press the L key. What you see on your screen will look quite different from what is designated inside the brackets. Another example is {22 SPACEs}, which instructs you to press the space bar 22 times.

Listing 1. *64 Perfect Typist program.*

```
1 REM 64 PERFECT TYPIST
2 REM
3 REM WRITTEN BY:
4 REM JAMES E. BORDEN
5 REM 641 ADAMS ROAD
6 REM CARLISLE, PA 17Ø13
7 REM
1Ø POKE56,PEEK(56)-1:POKE52,PEEK(56):CLR
2Ø PG=PEEK(56):ML=PG*256+6Ø
3Ø FORX=ML TO ML+154:READD:T=T+D:POKEX,D:NE
   XT
4Ø IFT<>16251 THEN PRINT"ERROR IN DATA...":
   END
6Ø POKEML+4,PG:POKE ML+1Ø,PG:POKE ML+16,PG
7Ø POKE ML+2Ø,PG:POKE ML+32,PG:POKE ML+38,P
   G
8Ø POKE ML+141,PG
89 PRINT"{SHFT CLR}{CRSR RT}**************
   ************************"
9Ø SYS ML:PRINT "{CRSR RT}** 64 PERFECT TYP
   IST IS NOW ACTIVE{2 SPACEs}**"
1ØØ PRINT "{CRSR RT}** SYS"ML"=ON{5 SPACEs}
    SYS"ML+3Ø"=OFF **"
1Ø1 PRINT"{CRSR RT}**********************
    **************":NEW
11Ø DATA 173,ØØ5,ØØ3,2Ø1,ØØ3,2Ø8,ØØ1,Ø96
12Ø DATA 141,1Ø5,ØØ3,173,ØØ4,ØØ3,141,1Ø4
13Ø DATA ØØ3,162,1Ø3,16Ø,ØØ3,142,ØØ4,ØØ3
14Ø DATA 14Ø,ØØ5,ØØ3,Ø96,234,234,173,1Ø4
15Ø DATA ØØ3,141,ØØ4,ØØ3,173,1Ø5,ØØ3,141
16Ø DATA ØØ5,ØØ3,Ø96,Ø32,124,165,132,Ø11
17Ø DATA 162,ØØØ,142,24Ø,ØØ3,142,241,ØØ3
18Ø DATA 189,ØØØ,ØØ2,24Ø,Ø51,2Ø1,Ø32,2Ø8
19Ø DATA ØØ4,164,212,24Ø,Ø4Ø,2Ø1,Ø34,2Ø8
2ØØ DATA ØØ8,Ø72,165,212,Ø73,ØØ1,133,212
21Ø DATA 1Ø4,Ø72,238,241,ØØ3,173,241,ØØ3
22Ø DATA Ø41,ØØ7,168,1Ø4,Ø24,Ø72,Ø24,1Ø4
23Ø DATA Ø16,ØØ1,Ø56,Ø42,136,Ø16,246,1Ø9
24Ø DATA 24Ø,ØØ3,141,24Ø,ØØ3,232,2Ø8,2ØØ
25Ø DATA 173,24Ø,ØØ3,Ø24,1Ø1,Ø2Ø,Ø24,1Ø1
26Ø DATA Ø21,141,24Ø,ØØ3,169,Ø42,Ø32,21Ø
27Ø DATA 255,169,ØØØ,174,24Ø,ØØ3,Ø32,2Ø5
28Ø DATA 189,162,ØØ3,189,211,ØØ3,Ø32,21Ø
29Ø DATA 255,2Ø2,Ø16,247,164,Ø11,Ø96,145
3ØØ DATA Ø13,Ø32,Ø32
```

Listing 2. *128 Perfect Typist program.*

```
1 REM 4Ø/8Ø COL 128 MODE PERFECT TYPIST
2 REM
3 REM WRITTEN BY:
4 REM JAMES E. BORDEN
5 REM 641 ADAMS ROAD
6 REM CARLISLE, PA 17Ø13
7 REM
1Ø FORX=512ØTO5379:READD:T=T+D:POKEX,D:NEXT

2Ø IFT<>28312 THENPRINT"{2 CRSR DNs}ERROR I
   N DATA...":END
25 A$="":IFPEEK(215)=128THENA$="{2Ø SPACEs}
   "
3Ø PRINT"{SHFT CLR}"A$"{CRSR RT}**********
   **************************"
4Ø PRINTA$"{CRSR RT}** 128 PERFECT TYPIST I
   S NOW ACTIVE **"
5Ø PRINTA$"{CRSR RT}**{2 SPACEs}SYS 512Ø=ON
   {7 SPACEs}SYS 515Ø=OFF{2 SPACEs}**"
6Ø PRINTA$"{CRSR RT}**********************
   ***************":SYS512Ø:NEW
512Ø DATA 173,ØØ5,ØØ3,2Ø1,Ø2Ø,2Ø8,ØØ1,Ø96,1
     41,Ø45
513Ø DATA Ø2Ø,173,ØØ4,ØØ3,141,Ø44,Ø2Ø,162,Ø
     43,16Ø
514Ø DATA Ø2Ø,142,ØØ4,ØØ3,14Ø,ØØ5,ØØ3,Ø96,2
     34,234
515Ø DATA 173,Ø44,Ø2Ø,141,ØØ4,ØØ3,173,Ø45,Ø
     2Ø,141
516Ø DATA ØØ5,ØØ3,Ø96,Ø32,Ø13,Ø67,14Ø,255,Ø
     19,162
517Ø DATA ØØØ,142,252,Ø19,142,253,Ø19,142,2
     54,Ø19
518Ø DATA 189,ØØØ,ØØ2,2Ø1,Ø32,24Ø,ØØ8,2Ø1,Ø
     48,144
519Ø DATA ØØ7,2Ø1,Ø58,176,ØØ3,232,2Ø8,238,1
     89,ØØØ
52ØØ DATA ØØ2,24Ø,Ø54,2Ø1,Ø32,2Ø8,ØØ5,172,2
     54,Ø19
521Ø DATA 24Ø,Ø42,2Ø1,Ø34,2Ø8,Ø1Ø,Ø72,173,2
     54,Ø19
522Ø DATA Ø73,ØØ1,141,254,Ø19,1Ø4,Ø72,238,2
     53,Ø19
523Ø DATA 173,253,Ø19,Ø41,ØØ7,168,1Ø4,Ø24,Ø
     72,Ø24
524Ø DATA 1Ø4,Ø16,ØØ1,Ø56,Ø42,136,Ø16,246,1
     Ø9,252
525Ø DATA Ø19,141,252,Ø19,232,2Ø8,197,173,2
     52,Ø19
526Ø DATA Ø24,1Ø1,Ø22,Ø24,1Ø1,Ø23,141,252,Ø
     19,169
527Ø DATA Ø42,Ø32,241,Ø2Ø,Ø32,188,Ø2Ø,16Ø,Ø
     Ø2,185
528Ø DATA 185,Ø2Ø,Ø32,241,Ø2Ø,136,Ø16,247,1
     65,116
529Ø DATA 2Ø8,ØØ9,165,117,2Ø8,ØØ5,169,145,Ø
     32,241
53ØØ DATA Ø2Ø,172,255,Ø19,Ø96,Ø13,Ø32,Ø32,1
     62,ØØØ
531Ø DATA 173,252,Ø19,232,Ø56,233,1ØØ,176,2
     5Ø,1Ø5
532Ø DATA 1ØØ,2Ø2,24Ø,ØØ3,Ø32,232,Ø2Ø,2Ø1,Ø
     1Ø,176
533Ø DATA ØØ5,2Ø5,252,Ø19,24Ø,Ø15,162,ØØØ,2
     32,Ø56
534Ø DATA 233,Ø1Ø,Ø16,25Ø,Ø24,1Ø5,Ø1Ø,2Ø2,Ø
     32,232
535Ø DATA Ø2Ø,17Ø,Ø72,138,ØØ9,Ø48,Ø32,241,Ø
     2Ø,1Ø4
536Ø DATA Ø96,17Ø,173,ØØØ,255,Ø72,169,ØØØ,1
     41,ØØØ
537Ø DATA 255,138,Ø32,21Ø,255,1Ø4,141,ØØØ,2
     55,Ø96
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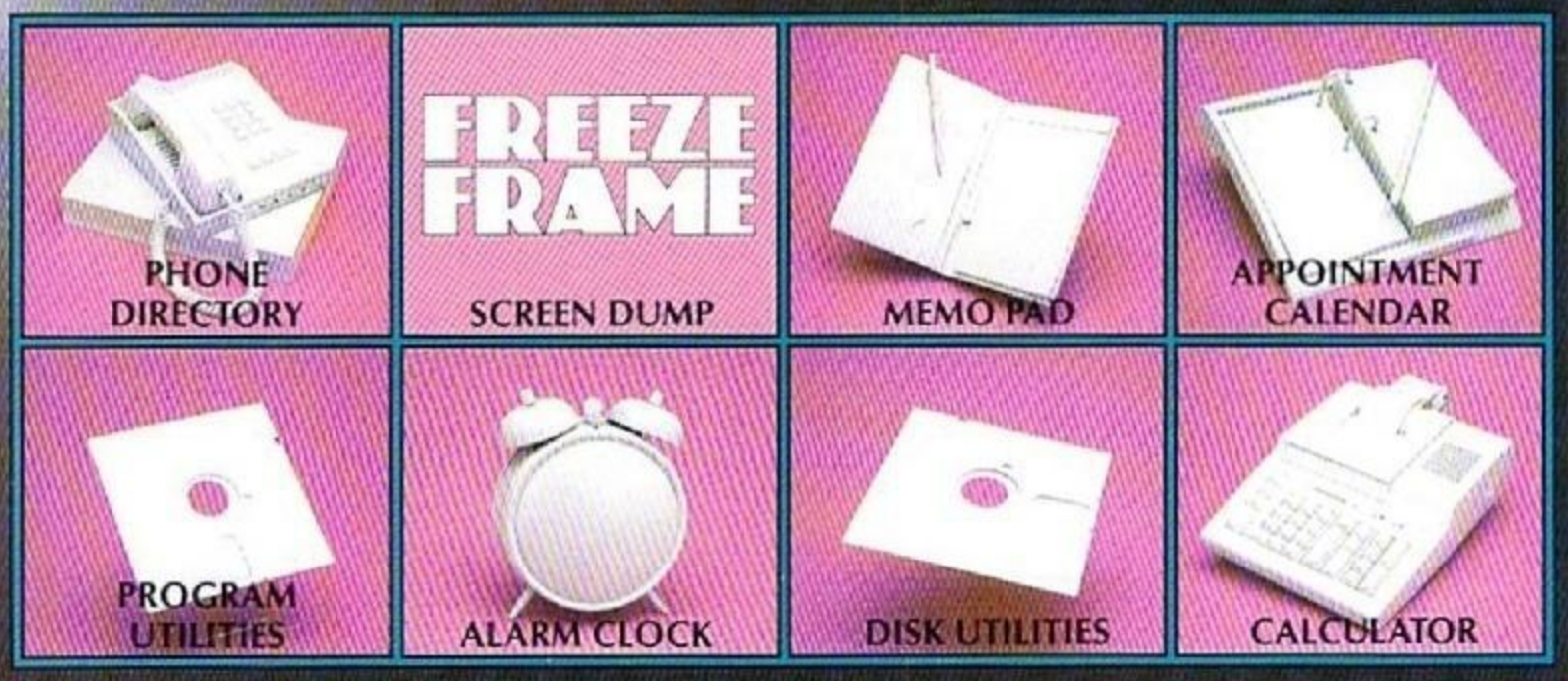

HIDDEN ASSETS makes the C-64 respond to your every thought. Just like Sidekick™, the most popular IBM/PC software in history, HIDDEN ASSETS puts many powerful utilities at your finger tips. HIDDEN ASSETS is totally transparent, so it responds instantly to your command — almost as an extension of your very thoughts!

Whenever you need to make a note, find a phone number, or remember an appointment, HIDDEN ASSETS responds immediately . . . no matter what program's in your computer. Need to schedule a meeting, or do a calculation? HIDDEN ASSETS is at your service! And it has a high-resolution screen dump, with on-line programming utilities and disk utilities!

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The Wizards from the Land of Oz have done it again!

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On the subject of value, Commodore computers are priced low enough to allow you to put more students on computers for less money than any other leading brand. What's more, the Commodore 64® and Commodore 128™ afford you a choice of some 2,000 quality educational programs, including those of the leading software manufacturers, MECC, Scholastic and Hayden. And Commodore's performance is backed by an extensive school service network.

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For more information, write to: Commodore Business Machines, 1200 Wilson Drive, West Chester, PA 19380, Attention: Education Department.

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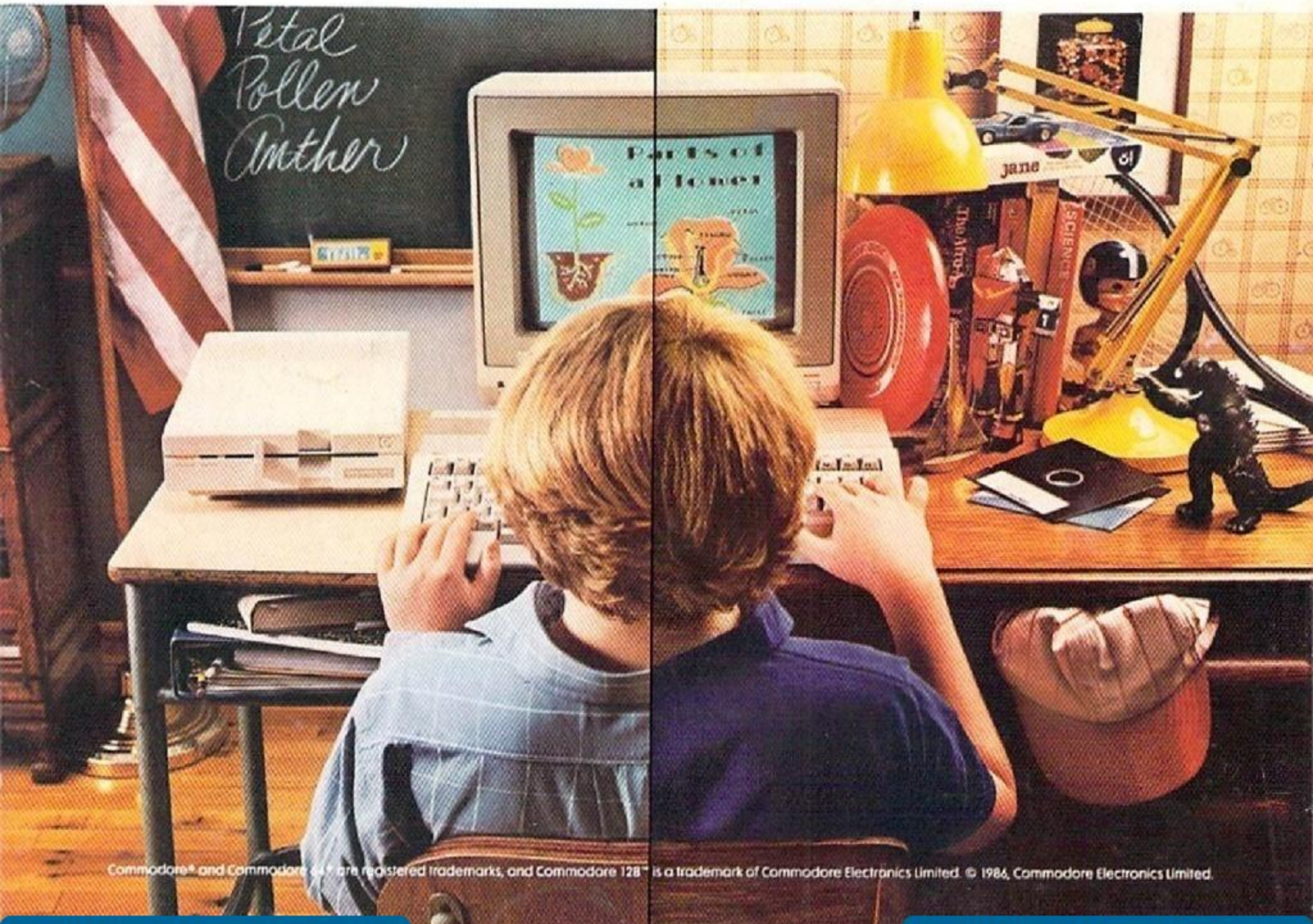

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